

ILLUSTRATED FLORA OF THE PACIFIC STATES

—
LEROY ABRAMS



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ILLUSTRATED FLORA

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ILLUSTRATED FLORA

OF THE

PACIFIC STATES

WASHINGTON, OREGON, AND CALIFORNIA

BY

LEROY ABRAMS

IN FOUR VOLUMES

VOL. III

GERANIACEAE TO SCROPHULARIACEAE

GERANIUMS TO FIGWORTS

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PREFACE

The author is very grateful to the following contributors: Roxana Stinchfield Ferris for the family Euphorbiaceae, except for the genus *Euphorbia* which was contributed by Louis Cutter Wheeler, and for the text of *Hackelia* in the Boraginaceae; Ira Loren Wiggins for the families Malvaceae, Cactaceae, except for the genus *Opuntia* which he contributed jointly with Carl Brandt Wolf, and the Solanaceae; George Neville Jones for the family Hypericaceae; Philip Alexander Munz for the family Onagraceae; Mildred Esther Mathias and Lincoln Constance for the family Umbelliferae; Rimo Bacigalupi for the family Garryaceae; Herbert Louis Mason for the family Polemoniaceae, except for the genus *Polemonium* which was contributed by John Fraser Davidson and for the genus *Gilia* which was contributed jointly by Herbert Louis Mason and Alva Day Grant; Lincoln Constance for the family Hydrophyllaceae; and Francis Whittier Pennell for the family Scrophulariaceae, except for the genera *Orthocarpus* and *Penstemon* which were written by David Daniels Keck. The text of the remaining families was written by the author. Ira Loren Wiggins has given much assistance in solving the nomenclatorial and taxonomic problems. Roxana S. Ferris has selected the material for the original illustrations and, together with Sylvia Vincent and Barbara Law, has done the necessary editorial work of checking references and reading manuscript and proof.

As in Volume I the illustrations are original except those which were used from Britton and Brown's *Illustrated Flora of the Northern United States and Canada*. The use of these illustrations is gratefully acknowledged to the New York Botanical Garden. The original drawings are, for the most part, the work of Jeanne Russell Janish. The drawings for the Onagraceae and Polemoniaceae were, in part, made at Pomona College and the University of California, respectively. A number of drawings scattered throughout the various plant families have been made by William S. Atkinson, Alice Baldwin Addicott, Louise Nash, and Lawrence Beane.

L. R. A.

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ILLUSTRATED FLORA

VOL. III



Family 71. GERANIACEAE.

GERANIUM FAMILY.

Herbs with alternate or opposite, palmately lobed or pinnate leaves, usually with stipules. Flowers regular or slightly irregular. Sepals 5, rarely fewer, usually persistent. Petals of the same number as sepals, hypogynous. Stamens as many or 2-3 times as many; anthers 2-celled, versatile. Carpels 5, united about a central axis, each 1-2-ovuled, indehiscent, at length elastically splitting away from below, and beaked by the long style.

About 12 genera and 470 species, natives of the temperate regions, most abundant in South Africa.

Anther-bearing stamens 10; style-beaks glabrous on the inner surface.

1. *Geranium*.

Anther-bearing stamens 5, alternating with 5 sterile filaments; style-beaks pubescent on the inner surface.

2. *Erodium*.

1. GERANIUM [Tourn.] L. Sp. Pl. 676. 1753.

Herbs with stipulate, palmately lobed, cleft or divided leaves and axillary 1-2-flowered peduncles. Flowers regular, 5-merous. Sepals imbricated. Petals hypogynous, imbricated. Stamens 10, generally 5 longer and 5 shorter. Style persistent, glabrous on the inner surface, becoming recurved. Carpel opening along the inner face. [Name Greek, a crane, from the long beak of the fruit.]

About 190 species, widely distributed in temperate regions. Type species, *Geranium sylvaticum* L.

Plants annual or biennial.

Peduncle 1-flowered.

1. *G. sibiricum*.

Peduncle 2-flowered.

Sepals without subulate tips; seeds smooth.

Stamens 10; carpel-bodies wrinkled, glabrous.

2. *G. molle*.

Stamens 5; carpel-bodies not wrinkled, pubescent.

3. *G. pusillum*.

Sepals with subulate tips; seeds reticulate or pitted.

Style-beak and its branches less than 3 mm. long; fruiting pedicels about equaling the calyx.

Seeds deeply reticulate; carpel-bodies short-hirsute with spreading hairs.

4. *G. dissectum*.

Seeds finely reticulate; carpel-bodies long-villous with ascending hairs.

5. *G. carolinianum*.

Style-beak and its branches more than 4 mm. long; fruiting pedicels much longer than the calyx.

Peduncles appressed-pubescent or with retrorse glandless hairs.

6. *G. columbinum*.

Peduncles glandular-pubescent with spreading hairs.

7. *G. Bicknellii longipes*.

Plants perennial from taproots or rootstocks.

Petals less than 1 cm. long; stems rather densely and retrorsely pubescent, not glandular.

8. *G. retrorsum*.

Petals over 1 cm. long.

Petals glabrous except for the cilia at base; free tips of styles 1-2.5 mm. long; fruiting pedicels erect and straight.

9. *G. oreganum*.

Petals pilose on the lower one-fourth to one-half of the inner surface; fruiting pedicels spreading or reflexed and ultimately bent upward.

Petals pilose on the lower one-fourth of inner surface; stems stout.

Lower part of stem and petioles of basal leaves glandular-villous with an indument of short glandular pubescence.

10. *G. viscosissimum*.

Lower part of stems and petioles of basal leaves strigose or retrorsely pubescent with whitish nonglandular hairs.

11. *G. nervosum*.

Petals pilose on the lower one-half of the inner surface; stems slender.

Free tips of styles 3-4.5 mm. long.

12. *G. Richardsonii*.

Free tips of styles 6-9 mm. long.

13. *G. californicum*.

1. *Geranium sibiricum* L. Siberian Geranium. Fig. 2963.

Geranium sibiricum L. Sp. Pl. 683. 1753.

Annual, the stems 3-10 dm. long, decumbent or ascending, freely branched, whole plant villous-pubescent. Leaves nearly orbicular, 5-7 cm. broad, deeply 3-5-parted; divisions broadly lanceo-

late, cleft or toothed; peduncles slender, 5–8 cm. long, 1-flowered, 2-bracted near the middle; sepals oval, 6–7 mm. long, minute, awn-tipped; petals white with purple veins, slightly exceeding the sepals; fruiting style-beak 10–13 mm. long, carpel-bodies 3–3.5 mm. long, puberulent and sparingly hairy; seeds minutely reticulate.

Sparingly naturalized in the Pacific States, also New York and Illinois. Type locality: Siberia. May–June.

2. *Geranium molle* L. Dove's-foot Geranium. Fig. 2964.

Geranium molle L. Sp. Pl. 682. 1753.

Annual, the stems widely branching from the base, slender, decumbent or ascending, 1–5 dm. long, whole plant soft-villous. Leaves reniform-orbicular, 15–35 mm. broad, generally cleft only to a little below the middle; the divisions 7–11, obovate or cuneate, 3–5-toothed at the apex; peduncles 2-flowered; sepals 4–5 mm. long, not awned; carpel-bodies distinctly wrinkled transversely, glabrous; fruiting style-beak 10 mm. long, sparingly pubescent; seeds smooth or striate.

Lawns and pastures, naturalized from Europe, Humid Transition Zone; Vancouver Island to southern California. Feb.–June.

3. *Geranium pusillum* L. Small-flowered Geranium. Fig. 2965.

Geranium pusillum L. Sp. Pl. ed. 2. 957. 1763.

Annual, the stems slender, weak, widely branching from the base, 1–5 dm. long, whole plant pubescent or short-villous. Leaves reniform-orbicular, 10–35 mm. broad, deeply divided into 7–9 divisions, these oblong, entire or 3-toothed; peduncles short, 5–15 mm. long, 2-flowered; pedicels 10–25 mm. long; sepals 3–4 mm. long, awnless; petals pale purple, little exceeding the sepals, notched; carpel-bodies pubescent or strigose, not wrinkled; fruiting style-beak 8–9 mm. long; seeds smooth.

Waste places, naturalized from Europe, mainly Humid Transition Zone; British Columbia, Washington, Oregon and coastal northern California; also eastern United States and Canada. May–Sept.

4. *Geranium dissectum* L. Cut-leaved Geranium. Fig. 2966.

Geranium dissectum L. Amoen. Acad. 4: 282. 1760.

Geranium laxum Hanks, N. Amer. Fl. 25: 9. 1907.

Annual, resembling the preceding species, the stems usually more slender, decumbent or ascending, retrorsely pubescent. Leaves deeply cleft, the main divisions parted into linear segments; pedicels glandular-hirsute; sepals 7–8 mm. long including the awn-tips, which are about 2–3 mm. long; petals purple, about equaling the sepals; fruiting style-beak about 12 mm. long, glandular-villous; carpel-bodies 2–2.5 mm. long, hirsute; seeds deeply reticulate.

Moist meadows and waste places, Transition and Upper Sonoran Zones; frequent in the Pacific States, and possibly native, but scarcely distinct from the European type. Type locality: southern Europe. April–Oct.

5. *Geranium carolinianum* L. Carolina Geranium. Fig. 2967.

Geranium carolinianum L. Sp. Pl. 682. 1753.

Annual or biennial, the stems usually branched below, erect or ascending, more or less glandular-pubescent. Leaves reniform-orbicular, 3–6 cm. broad, deeply divided, the main divisions cleft or parted into oblong or oblong-linear lobes; peduncles and pedicels short, the flowers usually in compact clusters at the ends of the branches; sepals oval, 6–10 mm. long, 3–4.5 mm. wide, the awn-tips about 2 mm. long; petals pale rose or white, about equaling the sepals; fruiting style-beak 12–18 mm. long, pubescent with spreading often somewhat glandular hairs; carpel-bodies 3–3.5 mm. long, pilose with erect hairs; seeds finely reticulate, 1–1.5 mm. thick.

Moist meadows or banks, Transition and Upper Sonoran Zones; throughout the Pacific States and extending across the continent. Type locality: Carolina. April–Oct.

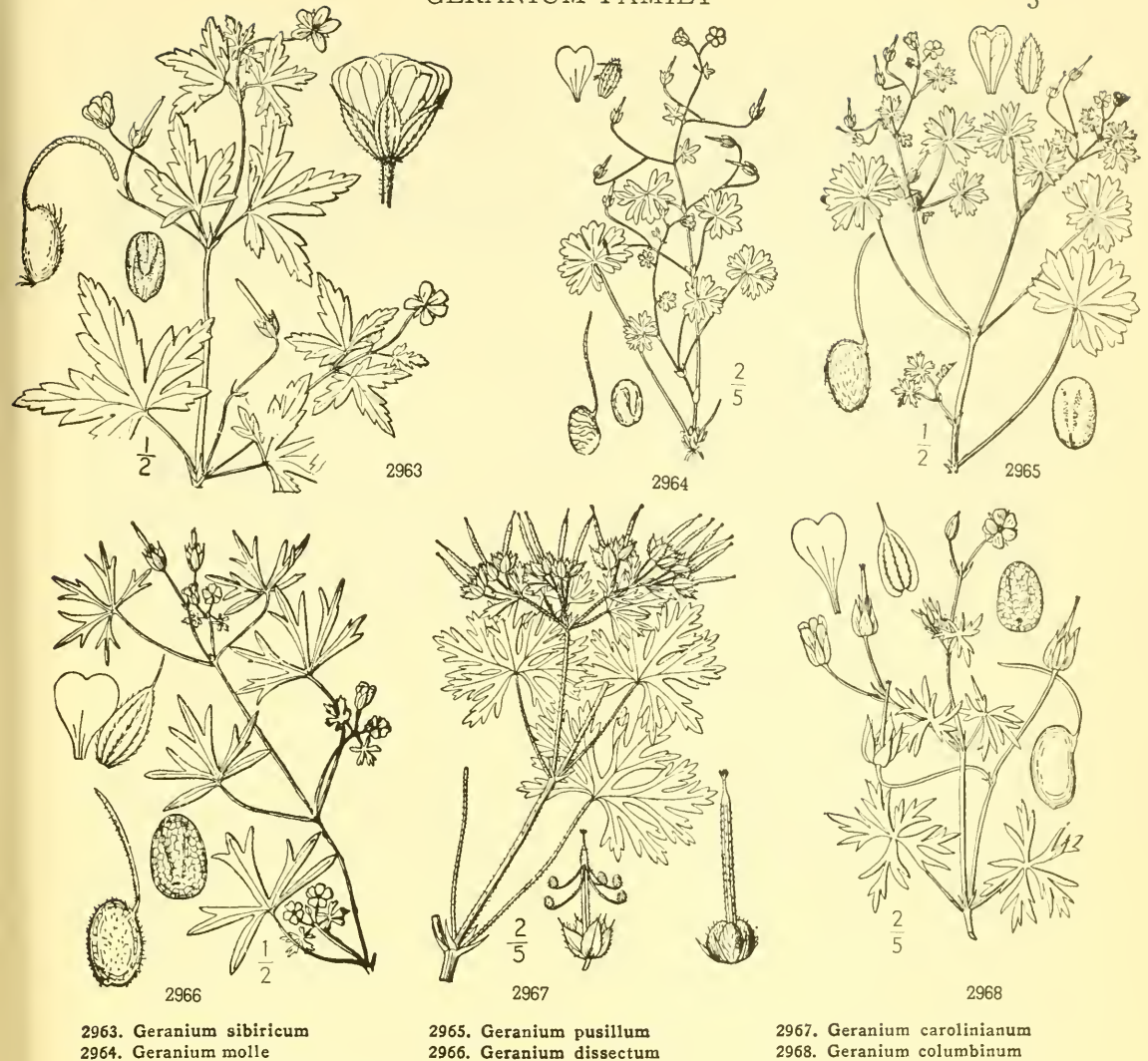
Geranium sphaerospermum Fernald, Rhodora 37: 298, pl. 372, figs. 1–5. 1935. Very similar to *G. carolinianum*; mature sepals 5–8 mm. wide, 5-nerved; seeds subspherical, 2–2.5 mm. thick. Washington south to northern California and east to Ontario and New York. Type locality: Great Cloche Island, Ontario.

6. *Geranium columbinum* L. Long-stalked Geranium. Fig. 2968.

Geranium columbinum L. Sp. Pl. 682. 1753.

Annual, the stems slender, decumbent or prostrate, sparsely pubescent with appressed hairs. Leaves orbicular-reniform in outline, 5–9-parted, the main divisions rather narrow, variously cleft into linear segments; peduncles and pedicels slender, usually longer than the leaves, retrorsely pubescent; sepals awn-tipped, 10–12 mm. long; petals rose-purple, slightly exceeding the sepals; style-beak 15 mm. long, strigose; carpel-bodies 3–3.5 mm. long, smooth and glabrous; seeds prominently reticulate.

Sparingly naturalized in Washington and Oregon, also in the eastern United States. Type locality: Europe. May–Aug.



7. *Geranium Bicknellii* var. *longipes* (S. Wats.) Fernald. Bicknell's Geranium.
 Fig. 2969.

Geranium carolinianum var. *longipes* S. Wats. Bot. King Expl. 50. 1871.

Geranium nemorale Suksd. Deutsch. Bot. Monatss. 16: 222. 1898.

Geranium longipes Goodding, Bot. Gaz. 37: 56. 1904.

Geranium Bicknellii var. *longipes* Fernald, Rhodora 37: 297. 1935.

Annual, the stems simple below and erect, or branched and more or less spreading, pubescent with spreading hairs, often glandular above, the lower node retrorsely pubescent. Leaves 2-7 cm. broad, somewhat angulate and 5-sided or the lowest orbicular in outline, the main divisions incised or cleft into lanceolate or oblong segments; petioles, peduncles and pedicels glandular-pubescent; sepals awn-tipped, 7-8 mm. long; petals rose-purple, about equaling the sepals; fruiting style-beak 16-22 mm. long, glandular-hirsute.

Sandy soils in clearings and burnt-over lands, mainly Arid Transition Zone; British Columbia to Washington, Oregon and northern California, east to Nova Scotia and New York. Type locality: southeastern New York. May-Aug.

Geranium pyrenæicum Burm. f. Sp. Geran. 27. 1759. Perennial with a short scaly caudex, the stems simple below, sometimes tufted, retrorsely hirsute. Leaves orbicular in outline, 4-9 cm. broad, the 5-7 main divisions 3-5-lobed; peduncles and pedicels glandular-puberulent; sepals awnless, 5-6 mm. long, ciliate; petals purple, about twice as long as the sepals, obcordate; fruiting style-beak 12-15 mm. long, glandular-pubescent; seeds granular. Native of Europe, locally naturalized in California.

8. *Geranium retrorsum* L'Hér. New Zealand Geranium. Fig. 2970.

Geranium pilosum Forst. f. ex DC. Prod. 1: 642. 1824. Not Cav. 1788.

Geranium retrorsum L'Hér. ex DC. Prod. 1: 644. 1824.

Geranium pilosum var. *retrorsum* Jepson, Man. Fl. Calif. 589. 1925.

Perennial with a large taproot and branched caudex, the stems branched, 1-6 dm. long, more

or less retrorse-hirsute. Leaves 15–40 mm. broad, finely hirsute, 3–5-parted, the main divisions cleft or incised into linear or lanceolate lobes; pedicels retrorsely and usually appressed-pubescent; sepals awn-tipped, 5–6 mm. long, finely hirsute; petals purple, 6–9 mm. long, deeply notched at the apex; fruiting style-beak 9–11 mm. long, minutely pubescent; seeds minutely reticulate.

Sparingly introduced from Australasia; San Francisco, Marin and Humboldt Counties, California. Type locality: New Zealand. June–Sept.

Geranium glabrätum (Hook.) Small, N. Amer. Fl. 25: 10. 1907. Perennial with a taproot and a more or less branched caudex, the stems spreading or decumbent, 1–7 dm. long, sparingly pubescent with retrorse hairs or nearly glabrous. Leaves 2–4 cm. broad, sparingly pubescent, 3–5-parted, the main divisions cuneate, usually with 3 broad teeth at the apex; pedicels retrorse-pubescent; sepals awn-tipped, about 5 mm. long, becoming nearly glabrous, except on the nerves; petals purple, 5–6 mm. long, nearly rounded at the apex; fruiting style-beak 11–12 mm. long, minutely pubescent; seeds reticulate. Native of Australasia, sparingly naturalized in California.

9. *Geranium oreganum* Howell. Oregon Geranium. Fig. 2971.

Geranium incisum Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 206. 1838, as a synonym; Trelease, Mem. Bost. Soc. Nat. Hist. 4: 74. 1888. Not Andrews 1797.

Geranium albiflorum var. *incisum* Torr. & Gray, loc. cit.

Geranium Hookerianum var. *incisum* Walp. Rep. 1: 450. 1842.

Geranium oreganum Howell, Fl. N. W. Amer. 106. 1897.

Perennial, with simple caudex, the stout scape-like stems 3–7 dm. high, sparingly hirsute or glabrate, not glandular. Leaves 6–15 cm. wide, strigose on both sides, somewhat 5-angled in outline, 5-parted, the divisions cleft and coarsely toothed; pedicels glandular-hirsute; sepals awn-tipped, 11–12 mm. long, short-hirsute; petals 15–23 mm. long, purple, glabrous except the ciliate base; filaments ciliate at base; free style-tips 2 mm. long; fruiting style-beak 3–5 cm. long, densely glandular-pubescent; seeds 3–3.5 mm. long, closely reticulate.

Edges of woods and open moist ground, Humid Transition Zone; southwestern Washington south through Oregon on the west side of the Cascade Mountains to northwestern California. Type locality: Willamette Valley, Oregon. May–Sept.

10. *Geranium viscosissimum* Fisch. & Mey. Sticky or Viscid Geranium. Fig. 2972.

Geranium viscosissimum Fisch. & Mey. Ind. Sem. Hort. Petrop. 11: Suppl. 18. 1846.

Geranium canum Rydb. N. Amer. Fl. 25: 14. 1907.

Perennial with stout, usually simple caudex, the stems stout, scape-like, 3–8 dm. high, first internode much elongated, densely villous with spreading or sometimes retrorse usually viscid hairs, interspersed with more or less abundant short glandular hairs. Leaves 6–12 cm. wide, densely hoary, suborbicular in outline, 3–5-parted, the divisions sharply incised; pedicels densely glandular-hirsute; sepals awn-tipped, 13–15 mm. long, glandular-pubescent; petals purple, 13–18 mm. long; free style-tips 4–5.5 mm. long; fruit glandular toward the apex; seeds closely reticulate.

Prairies and open woods, Arid Transition Zone; British Columbia and northeastern Washington to northern California and northwestern Nevada, east to Saskatchewan and western South Dakota. Type locality: western North America. May–Aug.

11. *Geranium nervosum* Rydb. Teton Geranium. Fig. 2973.

Geranium nervosum Rydb. Bull. Torrey Club 28: 34. 1901.

Geranium strigosum Rydb. Bull. Torrey Club 29: 243. 1902. Not Burm. f. 1768.

Geranium strigosius St. John, Fl. S. E. Wash. 243. 1937.

Perennial, with usually simple caudex and scape-like stems, pubescent below with short retrorse nonglandular hairs. Leaves 5–10 cm. broad, 3–5-parted, the divisions incised; petioles of the basal leaves elongated, retrorsely pubescent; pedicels glandular-hirsute, the glands often yellowish; sepals awn-tipped, 9–11 mm. long, minutely pubescent and ciliate; petals 15 mm. long, pink with prominent darker veins; fruiting stylar column 25–30 mm. long, glandular-hirsute; seeds reticulate.

Woods and open meadows, Arid Transition and Canadian Zones; eastern Washington to northeastern California and Nevada, Wyoming, and Colorado. Type locality: Fish Creek, Teton Forest Range, Wyoming. May–Aug.

12. *Geranium Richardsonii* Fisch. & Trautv. Richardson's Geranium. Fig. 2974.

Geranium albiflorum Hook. Fl. Bor. Amer. 1: 116. 1831. Not Ledeb. 1831.

Geranium Richardsonii Fisch. & Trautv. Ind. Sem. Hort. Petrop. 4: 37. 1837.

Geranium Hookerianum Walp. Rep. 1: 450. 1842.

Geranium pentagynum Engelm. in Wisliz. Mem. Tour North. Mexico 90. 1848.

Geranium loloense St. John, Fl. S. E. Wash. 242. 1937.

Perennial, the stems erect or ascending, 2.5–7 dm. high, usually simple, glabrous or sparingly glandular-pubescent. Leaves thin, 3–15 cm. broad, 3–7-parted, the main divisions incised, toothed or lobed, sparsely strigose on the upper surface and on the veins beneath; pedicels slender, 1–2 cm. long, glandular-pubescent, the glands usually purple; sepals awn-tipped, 8–12 mm. long, the outer ones more or less glandular-pubescent at least below; petals white, with pink or purple veins, rarely flushed with pink, 10–18 mm. long, pilose inside for about half their length; filaments reddish purple, short-pilose about three-fourths their length; mature stylar column 2–2.5 cm. long, pubescent and with interspersed glandular-villous hairs; free style-branches yellow-

ish, 3–5 mm. long; carpel-bodies sparingly pubescent, and glandular-hispid on the keel; seeds 2.5–3.5 mm. long, coarsely reticulate.

Moist soils, Transition and Canadian Zones; eastern British Columbia to Saskatchewan and South Dakota, south to northern Mexico. In the Pacific States it ranges from the Cascade Mountains of southern Oregon south through the Sierra Nevada to the mountains of southern California. Type locality: valleys of the Rocky Mountains, collected by Drummond between latitudes 52° N. and 54° N. May–July.

Geranium concinnum G. N. & F. F. Jones, *Rhodora* 45: 38. 1943. Somewhat intermediate between *G. Richardsonii* and *G. californicum*. The length of the free style-tips is intermediate between the two species; hairs of the pedicels are tipped with yellowish glands instead of purple; pubescence of the stem and petioles differs from both species in being finely retrorse-pubescent to nearly glabrous; petals 10–15 mm. long, pale pink or lavender. Known localities are: Olancha Mountain and Kern River (type locality), Tulare County; Frazier Mountain, Ventura County; and Bear Valley, San Bernardino County, California; all stations at altitudes of 7,000–9,000 feet.

13. *Geranium californicum* G. N. & F. F. Jones. California Geranium. Fig. 2975.

Geranium leucanthum Small, N. Amer. Fl. 25: 18. 1907. Not Griseb. 1874.

Geranium californicum G. N. & F. F. Jones, *Rhodora* 45: 38. 1943.

Perennial, with a heavy caudex and ascending rather slender stems, 2–4 dm. high. Leaves thin, 3-parted, the divisions incised or toothed, more or less appressed-pilose; petioles with spreading or retrorse pilose hairs; pedicels and sepals densely glandular-pubescent, the glands usually yellowish; petals 16–21 mm. long, veiny, white or pale pink; style-column 20–25 mm. long; style-branches 6–7 mm. long; carpel-bodies hairy.

Moist woods or meadows, Arid Transition Zone; Sierra Nevada, from Yosemite National Park southward, and in the San Bernardino and San Jacinto Mountains, California. Type locality: Pine Ridge, Fresno County, California. June–Aug.

Pelargonium L'Hér. ex Ait. Hort. Kew. 2: 424. 1789. The well-known *pelargoniums* or “geraniums” of gardens belong to this African genus, which is distinguished from true geraniums chiefly by the irregular flowers. Several species often grow spontaneously along roadsides or in waste places where garden refuse has been dumped, especially in southern California.

2. *ERODIUM* L'Hér. ex Ait. Hort. Kew. 2: 414. 1789.

Herbs with mostly jointed nodes, opposite or alternate stipulate leaves, and axillary umbellate nearly regular flowers. Sepals 5, imbricated. Petals 5, hypogynous, imbricated, the 2 upper slightly smaller. Glands 5. Anther-bearing stamens 5, with slightly dilated filaments alternating with as many sterile filaments. Styles becoming spirally coiled after splitting away from the central column, pubescent on the inner face. Carpel-bodies narrowed at the base, closed. Seeds smooth. [Name Greek, meaning heron, in reference to the beaked fruit.]

About 60 species, widely distributed in temperate and subtropical regions. Type species, *Erodium crassifolium* Soland.

Leaves not pinnately parted.

Leaves palmately parted, lobed or toothed, cordate at base, about as broad as long.

Pedicels closely appressed-pubescent; leaves deeply cleft or divided.

1. *E. texanum*.

Pedicels glandular-pubescent with spreading hairs; leaves shallowly lobed or toothed.

2. *E. macrophyllum*.

Leaves pinnatifid, much longer than broad, not cordate at base.

3. *E. Botrys*.

Leaves pinnately parted.

Sepal-tips without bristle-like appendages; anther-bearing filaments 2-toothed.

4. *E. moschatum*.

Sepal-tips with 1 or 2 bristle-like appendages; anther-bearing filaments toothless.

5. *E. cicutarium*.

1. *Erodium texanum* A. Gray. Texas Filaree. Fig. 2976.

Erodium texanum A. Gray, Gen. III. 2: 130. 1849.

Stems several from the base, 4–25 cm. long, the whole plant appressed-pubescent and canescent, not glandular. Leaves deltoid-ovate or ovate, 1.5–5 cm. long, cordate, subpalmately 3–5-lobed, crenate-dentate; sepals minutely awn-tipped, 10–13 mm. long; petals purple, the early ones exceeding the sepals, the latter much reduced; fruiting style-beak 4–6 cm. long.

Sandy soils, Upper and Lower Sonoran Zones; Mojave and Colorado Deserts, southern California to Lower California and Texas. Type locality: Texas. April–May.

2. *Erodium macrophyllum* Hook. & Arn. Large-leaved Filaree. Fig. 2977.

Erodium macrophyllum Hook. & Arn. Bot. Beechey 327. 1837.

Mostly nearly or quite acaulescent, puberulent with few interspersed glandular hairs at least on the pedicels. Leaves triangular-ovate or reniform, crenate-serrate, sometimes crenately-lobed; peduncles exceeding the leaves, sepals glandular-hirsute, minutely awn-tipped, the outer 11–16 mm. long; petals equaling the sepals, dull white; carpel-bodies truncate, 2.5–4 mm. broad at apex, densely velvety-pubescent.

Occasional in dry grassy places in the valleys or low foothills, Upper Sonoran Zone; Oregon to Lower California. Type locality: California. March–May.

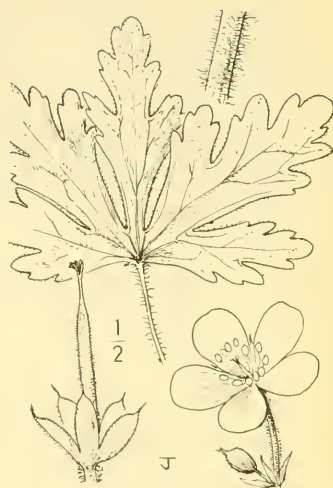
Erodium macrophyllum var. *californicum* (Greene) Jepson, Fl. W. Mid. Calif. 247. 1901. (*Erodium californicum* Greene, Fl. Fran. 99. 1891.) Like the typical species in general habit; peduncles and pedicels less puberulent, but abundantly beset with long gland-tipped hairs; petals purple. Central and southern California. Type locality: “Berkeley Hills and eastward in the Mt. Diablo Range.”



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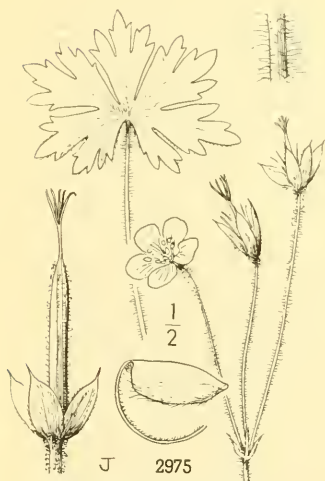
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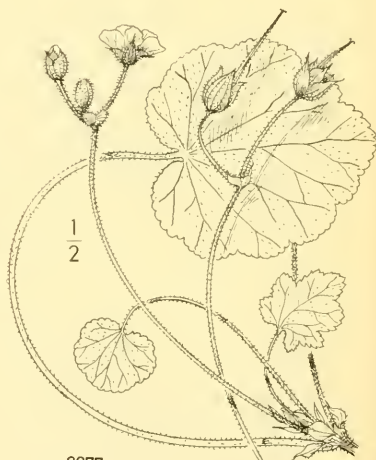
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2969. *Geranium Bicknellii*
 2970. *Geranium retrorsum*
 2971. *Geranium oreganum*

2972. *Geranium viscosissimum*
 2973. *Geranium nervosum*
 2974. *Geranium Richardsonii*

2975. *Geranium californicum*
 2976. *Erodium texanum*
 2977. *Erodium macrophyllum*

Erodium malachoides (L.) Willd. Phytog. 11. 1794. Stems branched from the base or rarely simple, the branches mostly simple, 1-3 dm. long, ascending, sparsely glandular-pilose. Leaves simple, broadly ovate, cordate, shallowly lobed and crenate-dentate, 1-2.5 cm. long, appressed-pubescent; peduncles 1-4-flowered; pedicels glandular-pilose; sepals glandular-pubescent, mucronate; petals rose-purple, 4-5 mm. long; fruiting styles about 2.5 cm. long. Locally established in central California. Native of the Mediterranean region.

Erodium cygnorum Nees in Lehm. Pl. Preiss. 1: 162. 1844. Stems 1-5 dm. high, somewhat hispidulous. Leaves villous, ovate in outline, 3-5-parted, the division incisely toothed; peduncles 3-5-flowered; pedicels not glandular; calyx pubescent; petals 6-7 mm. long, blue; fruiting styles 4-6 cm. long. Locally established in southern California. Native of Australia.

3. *Erodium Botrys* Bertol. Long-beaked Filaree. Fig. 2978.

Erodium Botrys Bertol. Amoen. Ital. 35. 1819.

Acaulescent or with a branching stem 3-5 dm. long, bristly-hirsute. Leaves pinnatifid or bipinnatifid, or the basal crenate; peduncles and pedicels glandular-hirsute; sepals 7-8 mm. long in flower, twice as long in fruit, minutely awn-tipped, glandular-pubescent, upper sepal margined with purple; petals 10-12 mm. long, cuneate, blunt at apex, purple with 3-5 dark purple veins; style-beak stout, 9-12 cm. long; pits on carpel-body at base of beak 2, each subtended by two folds forming smaller pits between.

Pastures and waste places, naturalized from the Mediterranean region; coastal valleys and foothills of California and sparingly in western Oregon. March-May.

Erodium obtusiplicatum (Maire, Weiller & Wilczek) J. T. Howell, Leaflets West. Bot. 5: 68. 1947. (*Erodium Botrys* f. *montanum* Brumh. Rep. Nov. Spec. 2: 118. 1906; *E. Botrys* var. *obtusiplicatum* Maire, Weiller & Wilczek, Bull. Soc. Hist. Nat. Afr. Nord 26: 120. 1935.) Similar to *Erodium Botrys* in habit; fruiting beak mostly shorter, 5.5-8.5 cm. long; pits in carpel-bodies 2, each with a single fold below; petals smaller, about equaling to one-fourth longer than the sepals. This is becoming common and widespread in California, but until recently (Wagon and Biswell, Madroño 7: 118-125. figs. 1-3. 1943) its distinctive characters have not been recognized. Type locality: Morocco.

4. *Erodium moschatum* (Burm. f.) L'Hér. Musk or White-stemmed Filaree. Fig. 2979.

Geranium moschatum Burm. f. Sp. Geran. 29. 1759.

Erodium moschatum L'Hér. ex Ait. Hort. Kew. 2: 414. 1789.

Acaulescent and prostrate or with ascending branches, mostly rather stout and glandular-pubescent. Leaves rather ample, pinnate; stipules large, obtuse; leaflets unequally and doubly serrate; peduncle several-flowered; sepals not terminated by long bristles, 6-7 mm. long; anther-bearing filaments 2-toothed.

Fields, pastures, and waste places, naturalized from southern Europe; British Columbia to southern California. Feb.-June.

5. *Erodium cicutarium* (L.) L'Hér. Red-stemmed Filaree. Fig. 2980.

Geranium cicutarium L. Sp. Pl. 680. 1753.

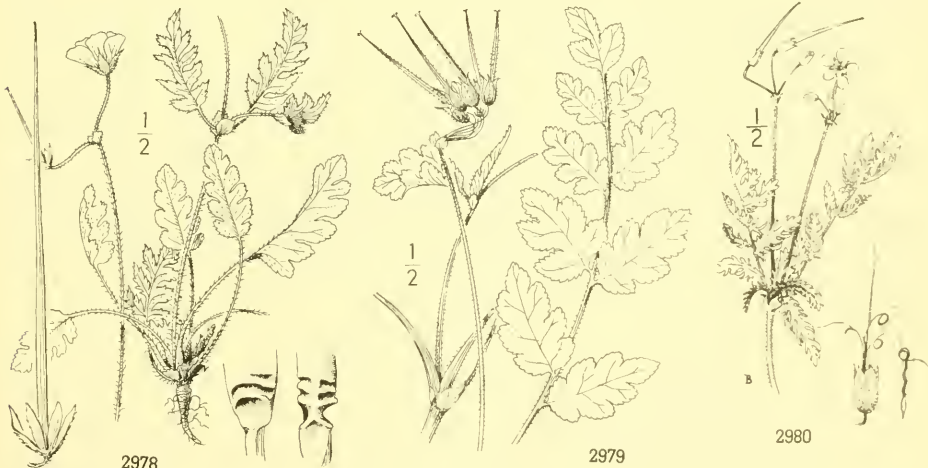
Geranium aethiopicum Lam. Encycl. 2: 266. 1786.

Erodium cicutarium L'Hér. ex Ait. Hort. Kew. 2: 414. 1789.

Erodium aethiopicum Brumh. & Thel. Mém. Soc. Sci. Cherbourg IV. 38: 352. 1911-12.

Acaulescent, or the stems 1-5 dm. long, decumbent or ascending, often canescent with hirsute pubescence, less glandular than the preceding. Leaves pinnate; leaflets laciniately pinnatifid with narrow acute lobes; pedicels slender; petals rose-colored or purple; sepals with 1-2 terminal bristle-like hairs; anther-bearing filaments not toothed.

Fields and waste places, naturalized from southern Europe; British Columbia to southern California. Feb.-June.



2978. *Erodium Botrys*

2979. *Erodium moschatum*

2980. *Erodium cicutarium*

Family 72. OXALIDACEAE.

WOOD-SORREL FAMILY.

Annual or perennial, leafy-stemmed or acaulescent herbs, often with rootstocks or scaly bulbs, with sour sap (oxalic acid), and mostly palmately 3-foliate leaves. Stipules commonly present as scarious margins to the bases of the petioles; leaflets mostly obcordate. Flowers perfect, in umbel-like or forking cymes or rarely solitary, on mostly rather long peduncles. Sepals 5, often unequal. Petals 5, white, purple, or yellow. Stamens 10–15. Ovary 5-lobed, 5-celled; styles united or distinct; ovules 2 to many in each cell. Fruit a loculicidal, globose or columnar capsule. Embryo straight; endosperm fleshy.

A family of 7 genera and about 330 species, chiefly in tropical regions.

1. *OXALIS* L. Sp. Pl. 433. 1753.

Perennial caulescent or acaulescent herbs, from taproots, rootstocks or bulbs. Leaves alternate, usually with elongated petioles, trifoliate; leaflets mostly obcordate, notched at the apex. Flowers on axillary or scape-like peduncles, sepals and petals 5; stamens 10. Seeds few to many in each cell, variously wrinkled, grooved, pitted or striate. [Name Greek, meaning sour, from the acid juice.]

A genus of about 300 species, mainly in warm temperate and tropical regions. Type species, *Oxalis Acetosella* L.

Flowers white or purple.

Cyme 1-flowered, subtended by 1 or 2 clasping bracts.

Cyme several-flowered, umbel-like, subtended by a whorl of narrow bracts.

Flowers yellow.

Plants acaulescent; rootstocks bearing bulblets; petals 20 mm. long.

Plants caulescent; rootstocks not producing bulblets; petals less than 20 mm. long.

Stems arising from slender rootstocks; longer filaments pubescent.

Petals 4–8 mm. long.

Petals 12–18 mm. long.

Stems arising from a tufted woody fusiform root; longer filaments glabrous.

Pedicels with spreading pubescence, shorter than the capsules.

Pedicels with appressed pubescence, longer than the capsules.

1. *O. oregana*.

2. *O. trilliifolia*.

3. *O. cernua*.

4. *O. corniculata*.

5. *O. Suksdorfii*.

6. *O. pilosa*.

7. *O. californica*.

1. *Oxalis oregana* Nutt. Oregon Wood-sorrel. Fig. 2981.

Oxalis oregana Nutt. in Torr. & Gray, Fl. N. Amer. 1: 211. 1838.

Oxalis Acetosella var. *oregana* Trelease, Mem. Bost. Soc. Nat. Hist. 4: 90. 1888.

Oxys oregana Greene, Man. Bay Reg. 71. 1894.

Oxalis macra Small, N. Amer. Fl. 25: 26. 1907.

Oxalis Smalliana R. Knuth, Notizblatt 7: 308. 1919.

Oxalis oregana var. *Tracyi* Jepson, Man. Fl. Pl. Calif. 588. 1925.

Acaulescent perennial from slender creeping rootstocks, more or less rusty-villous. Leaflets broadly obcordate, 2–3 cm. long, on petioles 5–15 cm. long; peduncles scape-like, bearing a single flower; pedicel subtended by 2 bracts; petals white or rose-colored, purple-veined, oblong-ovate, 15–20 mm. long; capsule round-ovoid, 7 mm. long.

Shady woods, Humid Transition and Canadian Zones; western Washington to Monterey County, California. Type locality: "Shady woods of the Oregon [Columbia River] in moist places." Feb.–Sept. Redwood Sorrel.

2. *Oxalis trilliifolia* Hook. Trillium-leaved Wood-sorrel. Fig. 2982.

Oxalis trilliifolia Hook. Fl. Bor. Amer. 1: 118. 1830.

Hesperoxalis trilliifolia Small, N. Amer. Fl. 25: 27. 1907.

Plants acaulescent, arising from stout rootstocks. Leaves with elongated glabrous or nearly glabrous petioles often 2 dm. long; leaflets broadly obcordate, 25–40 mm. wide, glabrous above, sparsely pubescent beneath; scapes about as long as the petioles; cyme umbel-like, 2–8-flowered; petals white or pink, 8–14 mm. long, deeply notched; capsule glabrous, erect, 25–30 mm. long, slender-fusiform.

Swamps and margins of streams, Canadian Zone; western Washington and Oregon. Type locality: near the Grand Rapids of the Columbia. June–Aug. Columbia Oxalis.

3. *Oxalis cernua* Thunb. Cape Oxalis. Fig. 2983.

Oxalis cernua Thunb. Diss. Oxalis 14. 1781.

Bolboxalis cernua Small, N. Amer. Fl. 25: 28. 1907.

Acaulescent perennial, somewhat fleshy, bright green, the rootstocks bearing bulblets at the nodes. Leaves basal, with elongated petioles; leaflets broadly obcordate, 20–35 mm. broad, glabrous or sometimes pubescent beneath; peduncles 1–4 dm. high, 4–20-flowered; sepals lanceo-

late or linear-lanceolate, 4-6 mm. long; petals deep yellow, 20-30 mm. long; filaments glabrous; capsule 5-8 mm. long, pubescent.

Escaped from gardens and naturalized in many places in the Pacific States, especially near the coast in California. Type locality: Cape of Good Hope. March-June.

4. *Oxalis corniculata* L. Creeping Wood-sorrel. Fig. 2984.

Oxalis corniculata L. Sp. Pl. 435. 1753.

Xanthoxalis corniculata Small, Fl. S.E.U.S. 667. 1903.

Stems several, decumbent and creeping, arising from a slender taproot and flowering as an annual, but rooting at the nodes and becoming a perennial, the erect branches seldom over 1 dm. high. Leaflets small, green or purplish; flowers 2-5 on very short, strigillose at length, deflexed pedicels; petals yellow, 4-6 mm. long, often with a reddish spot near the base; longer filaments sparsely pubescent; capsule columnar, longer than the pedicels.

An introduced weed of wide distribution, found chiefly in lawns and greenhouses. Type locality: Italy. March-Nov. Yellow Sorrel.

Oxalis corniculata var. *atropurpurea* Planch. Fl. Serres 12: pl. 1205. 1857. Herbage deep reddish purple, otherwise like the typical species. An escape from gardens, and often a weed along walks and in lawns, especially in central and southern California.

5. *Oxalis Suksdorfii* Trelease. Suksdorf's Wood-sorrel. Fig. 2985.

Oxalis pumila Nutt. in Torr. & Gray, Fl. N. Amer. 1: 212. 1838. Not Urv. 1829.

Oxalis Suksdorfii Trelease, Mem. Bost. Soc. Nat. Hist. 4: 89. 1888.

Xanthoxalis Suksdorfii Small, N. Amer. Fl. 25: 53. 1907.

Stems decumbent, arising from slender, sparsely branched rootstocks, 1-3 dm. long, more or less villous, often sparingly so. Leaflets deeply cordate, 15-25 mm. broad, bright green, with few scattered hairs on both surfaces; peduncles about equaling the petioles, 1-3-flowered; pedicels strigillose, refracted in fruit; petals yellow, 12-18 mm. long; longer filaments pubescent; capsules oblong, stout, densely short-pubescent.

Open forests, especially in disturbed areas, Humid Transition Zone; Vancouver, Washington, to Del Norte County, California. Type locality: "forests of the Rocky Mountains and Oregon." May-Aug.

6. *Oxalis pilosa* Nutt. Hairy Wood-sorrel. Fig. 2986.

Oxalis pilosa Nutt. in Torr. & Gray, Fl. N. Amer. 1: 212. 1838.

Xanthoxalis pilosa Small, N. Amer. Fl. 25: 54. 1907.

Stems arising from a woody fusiform root, erect or decumbent, 1-4 dm. long, densely pilose with hairs often retrorsely spreading. Leaflets 7-15 mm. broad, gray-green, densely or sparingly pubescent on both surfaces, ciliate; peduncles usually shorter than the capsules, refracted in fruit, hirsute; petals yellow, 8-12 mm. long; longer filaments glabrous, capsules cylindric, 12-28 mm. long.

Open grassy hillsides especially in sandy soil, Upper Sonoran and Transition Zones; California coastal region from Mendocino County to Los Angeles County. Type locality: Santa Barbara. April-Nov.

7. *Oxalis californica* (Abrams) R. Knuth. California Wood-sorrel. Fig. 2987.

Xanthoxalis californica Abrams, Bull. Torrey Club 34: 264. 1907.

Oxalis californica R. Knuth, Notizblatt 7: 300. 1919.

Stems tufted on long-fusiform woody roots, erect or decumbent, 1-4 dm. long, pubescent with lax or appressed hairs or nearly glabrous. Leaflets 7-15 mm. broad, gray-green, pubescent on both surfaces and ciliate; peduncles longer than the petioles, 1-3-flowered; pedicels very slender, strigillose, usually much longer than the capsule; petals yellow or tinged with purple, 9-13 mm. long; capsule cylindric, 10-15 mm. long.

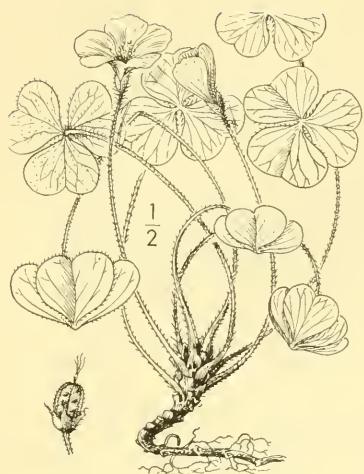
Gravelly or sandy soil, Upper Sonoran Zone; Los Angeles and San Bernardino Counties, California, south to Lower California, also Santa Catalina Island. Type locality: Onofre Mountains, San Diego County, California. March-June.

Tropaeolum majus L. Sp. Pl. 345. 1753. Nasturtium. Glabrous, somewhat succulent climbing annual. Leaves peltate, nearly orbicular, undulate on the margins; flowers axillary, showy, yellow and orange, irregular; sepals 5, united at base, the posterior produced into a straight short spur; two upper petals entire or undulate, three lower fringed on the claw. The common nasturtium, which belongs to the family *Tropaeolaceae*, has become fairly well established as an escape in southern California. It is a native of Peru.

Family 73. LINACEAE.

FLAX FAMILY.

Herbs or shrubs with alternate, or rarely opposite or whorled leaves. Stipules none, or when present small or gland-like. Flowers hypogynous, perfect and regular, racemose or cymose. Sepals 5, rarely 4 or 6, imbricated and persistent. Petals of the same number as the sepals and alternate with them, usually early deciduous. Stamens as many as sepals, their filaments united at base, and sometimes bearing staminodia in the sinuses; anthers 2-celled, versatile. Pistil with 2-3, or usually 5



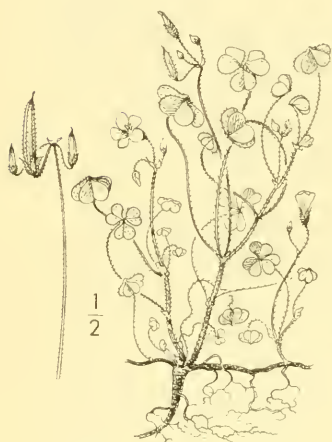
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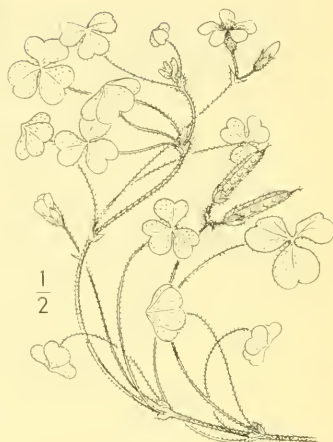
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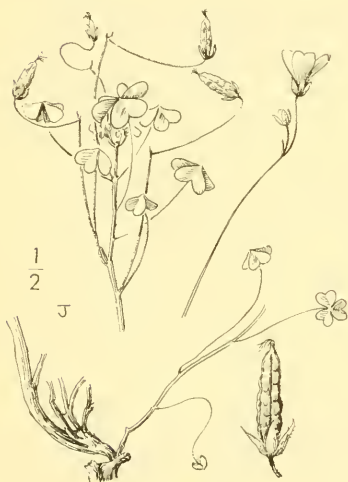
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2981. *Oxalis oregana*
2982. *Oxalis trilliifolia*
2983. *Oxalis cernua*

2984. *Oxalis corniculata*
2985. *Oxalis Suksdorfii*
2986. *Oxalis pilosa*

2987. *Oxalis californica*
2988. *Linum usitatissimum*
2989. *Linum angustifolium*

carpels, with as many free or partly united styles; ovary 1-5-celled, or falsely 4-10-celled. Ovules 1 or 2 in each cell. Fruit a capsule, splitting longitudinally into twice as many parts as carpels. Seeds 1-2 in each cell, oily; endosperm little or none; embryo straight.

About 14 genera and 160 species of wide geographical distribution.

1. *LINUM* [Tourn.] L. Sp. Pl. 277. 1753.

Annual or perennial herbs, sometimes woody at base. Stipules wanting, or small and gland-like. Leaves alternate, sessile, entire or rarely toothed. Sepals 5, persistent or deciduous. Petals 5, blue, red, yellow, or white. Stamens 5, their filaments united at base. Styles 2-5, elongated, distinct or partly united; stigmas elongated and introrse, or capitate and terminal. Capsule 2-5-celled; carpels with incomplete false septa. Seeds turgid, or flattened and lenticular or lunate. [The classical name of flax.]

About 90 species, natives of temperate and subtropical regions. Type species, *Linum usitatissimum* L.

Stigmas elongated, stigmatic along the inner surface; styles 5; petals unappendaged, blue; seeds flattened and lenticular.

Annual; sepals, at least the inner, ciliate on the margins.

Petals over 10 mm., often 15 mm. long; fruiting capsule 6-7 mm. high, its valves glabrous on the inner edge of the septum.

Petals under 10 mm., usually 7-8 mm. long; fruiting capsule 4-5 mm. high, its valves long-ciliate on the inner edge of the septum.

Perennial; sepals not ciliate on the margins.

Stigmas capitate and terminal; styles 2-5.

Petals unappendaged and entire at base, yellow or white; styles 2 or 4-5; seeds flattened and somewhat lunate.

Styles 4-5; herbage puberulent throughout; perennial.

Styles 2; herbage glabrous throughout; annual.

Petals with 1-3 ventral appendages and small lateral lobes at the base, rose-colored, white or yellow; styles 3; seeds turgid.

Leaves and bracts glandular-ciliate.

Flowers pink; leaves broadly ovate, flat.

Flowers yellow; leaves lanceolate, involute.

Leaves and bracts entire.

Petals yellow.

Staminodia 2; flowers scattered in pedicels well exceeding the calyx; petals 3-4 mm. long.

8. *L. Clevelandii*.

Staminodia none; upper flowers in clusters of 2-3; pedicels shorter than calyx; petals 5-7 mm. long.

9. *L. Breweri*.

Petals white, pink or rose-purple.

Flowers on long filiform pedicels, not congested.

Petals 2-3.5 mm. long, their lateral lobes rudimentary or obsolete.

10. *L. micranthum*.

Petals 5-7 mm. long, their lateral lobes prominent and a little thickened.

11. *L. spargulinum*.

Flowers short-pedicelled or sessile and congested at the ends of the branches.

Plants glabrous and glaucous.

12. *L. californicum*.

Plants pubescent.

13. *L. congestum*.

1. *Linum usitatissimum* L. Flax or Linseed. Fig. 2988.

Linum usitatissimum L. Sp. Pl. 277. 1753.

Annual, erect often tufted, branching above, 3-5 dm. high, glabrous and glaucous. Leaves alternate, 3-nerved, lanceolate, 1-4 cm. long, 2-6 mm. wide, 3-nerved; inflorescence a terminal cymose panicle; pedicels slender; sepals ovate, acuminate, the inner ones ciliate and 3-ribbed; petals blue, 10-12 mm. long, cuneate-obovate, crenulate; styles distinct or nearly so; capsule ovoid-conic, 6-8 mm. long; indehiscent.

Roadsides, naturalized from Europe; widely spread in the Pacific States, especially in western Washington and Oregon. May-June.

2. *Linum angustifolium* Huds. Narrow-leaved Flax. Fig. 2989.

Linum angustifolium Huds. Fl. Angl. ed. 2. 134. 1778.

Annual, the stems branching from the base, rather slender, 2.5-5 dm. high, upper flowering branches very slender. Leaves narrowly linear, 8-15 mm. long, sharply acute at apex; pedicels almost filiform, 1-2 cm. long; sepals 5 mm. long, ovate to broadly ovate, cuspidate at apex; petals blue, 7-8 mm. long; capsule subglobose, about equaling the sepals, inner margin of the valve-septa long-ciliate.

Adventive from the Mediterranean Region; western Oregon, especially along roadsides in Douglas County, and in coastal California from Humboldt County to San Mateo County. Type locality: Europe. June-Sept.

3. *Linum Lewisii* Pursh. Western Blue Flax. Fig. 2990.

Linum Lewisii Pursh, Fl. Amer. Sept. 210. 1814.

Linum decurrens Kell. Proc. Calif. Acad. 3: 44. 1863.

Linum Lyallianum Alef. Bot. Zeit. 25: 251. 1867.

Linum Lewisii var. *alpicola* Jepson, Fl. Calif. 2: 398. 1936.

Perennial, glabrous throughout, the stems 2-6 dm. high, often branched at the base. Leaves erect or ascending, 1-2 cm. long, linear, acute, sessile, erect or ascending; bracts similar to the leaves; fruiting pedicels 1-3 cm. long; sepals ovate, 5 mm. long, not ciliate; petals blue or rarely white, 15-20 mm. long; styles distinct; capsule globose, 6-10 mm. long; septa ciliate.

Mountain meadows and grassy slopes, mainly Arid Transition Zone; Alaska to southern California and northern Mexico, east to Manitoba, Montana, Wisconsin, and Texas. Type locality: valleys of the Rocky Mountains. May-July.

4. *Linum puberulum* (Engelm.) Heller. Desert Yellow Flax. Fig. 2991.

Linum rigidum var. *puberulum* Engelm. in A. Gray, Smiths. Contr. 3^o: 25. 1852.

Linum puberulum Heller, Plant World 1: 22. 1897.

Cathartolinum puberulum Small, N. Amer. Fl. 25: 80. 1907.

Pale green perennial, 5-25 cm. high, finely puberulent throughout. Leaves more numerous below, sparse above, sessile, subulate, 0.5-1.5 cm. long; petals yellow, 12-15 mm. long; capsule ovoid, 3.5-4.5 mm. high, surpassed by the sepals.

Desert ranges, Upper Sonoran Zone; eastern Mojave Desert, California, east to Colorado and Texas. Type locality: Santa Fe to the Cimarron River, New Mexico. May-July.

5. *Linum digynum* A. Gray. Northwestern Yellow Flax. Fig. 2992.

Linum digynum A. Gray, Proc. Amer. Acad. 7: 334. 1868.

Cathartolinum digynum Small, N. Amer. Fl. 25: 78. 1907.

Glabrous and glaucescent annual, the stems simple below, corymbosely branched above, 1-4 dm. high. Leaves mainly opposite and rather distant, the lower somewhat spatulate, the upper linear-oblong to elliptic, 8-25 mm. long, entire; bracts reduced, lanceolate-acuminate, serrate; sepals persistent, 2.5 mm. long, glandular-toothed; petals yellow, 3.5-4 mm. long; staminodia wanting; styles 2, united nearly to the middle; capsule ovoid, shorter than the sepals.

Moist meadows and bogs, mainly Arid Transition Zone; Spokane County, Washington, southward mainly east of the Cascade Mountains to the central Sierra Nevada, California. Type locality: Mariposa Trail, Sierra Nevada, California. June-July.

6. *Linum drymarioides* Curran. Drymaria Dwarf Flax. Fig. 2993.

Linum drymarioides Curran, Bull. Calif. Acad. 1: 152. 1885.

Hesperolinon drymarioides Small, N. Amer. Fl. 25: 84. 1907.

Stems dichotomously branched from near the base, 1-3 dm. high, sparingly short-villous. Leaves few, mostly broadly ovate, 3-10 mm. long, abruptly mucronate, sessile, flat, minutely glandular-toothed; bracts usually narrower and smaller than the leaves; fruiting pedicels slender, about equaling or exceeding the calyx; sepals 2.5-3 mm. long, lanceolate, acuminate, finely glandular-toothed; petals pink, scarcely equaling to slightly exceeding the sepals; capsule ovoid, 2.5 mm. long.

Dry rocky slopes, Upper Sonoran Zone; Inner Coast Ranges, Colusa and Lake Counties, California. Type locality: near Epperson's, Lake County. June-Aug.

7. *Linum adenophyllum* A. Gray. Glandular Dwarf Flax. Fig. 2994.

Linum adenophyllum A. Gray, Proc. Amer. Acad. 8: 624. 1873.

Hesperolinon adenophyllum Small, N. Amer. Fl. 25: 85. 1907.

Stems dichotomously branched above, 1-3 dm. high, minutely pubescent, especially above the nodes. Leaves linear-lanceolate, clasping, involutely folded, conspicuously and densely glandular-toothed; fruiting pedicels slender, longer than the calyx; sepals oblong-lanceolate to linear-lanceolate, 2.5-3 mm. long, sparingly and inconspicuously glandular-toothed; petals yellow, 4-6 mm. long; filaments filiform; capsule ovoid, shorter than the sepals.

Open hillsides, Upper Sonoran and Transition Zones; California Coast Ranges in Mendocino and Lake Counties. Type locality: near Clear Lake, Lake County. June-July.

8. *Linum Clevelandii* Greene. Cleveland's Dwarf Flax. Fig. 2995.

Linum Clevelandii Greene, Bull. Torrey Club 9: 121. 1882.

Hesperolinon Clevelandii Small, N. Amer. Fl. 25: 85. 1907.

Linum Clevelandii var. *petrophilum* Jepson, Fl. Calif. 2: 400. 1936.

Stems 1-3.5 dm. high, simple below, dichotomously branched above, puberulent or glabrous. Leaves linear, narrowed at the sessile base, 1-2 cm. long, acutish, entire, somewhat involute, pubescent above; bracts similar but smaller; pedicels 6-20 mm. long; sepals lanceolate, 2-2.5 mm. long, acute, the outer entire, the inner obscurely and sparsely glandular on the margins, glabrous; petals yellow, 3.5-4 mm. long; staminodia present, 2-lobed; capsules ovoid, slightly exceeding the calyx.

Dry ridges, usually associated with chaparral, Upper Sonoran Zone; North Coast Ranges, south to the Mount Hamilton Range, California. Type locality: Allen's Springs, Lake County. May-July.

9. *Linum Brèweri* A. Gray. Brewer's Dwarf Flax. Fig. 2996.*Linum Breweri* A. Gray, Proc. Calif. Acad. 3: 102. 1864.*Hesperolinon Breweri* Small, N. Amer. Fl. 25: 85. 1907.

Stems dichotomously branching above, 15–30 cm. high, the branches sparsely pubescent above the forks. Leaves alternate, linear, 10–15 mm. long, strongly involute, entire; bracts similar but smaller; stipular glands prominent; lower flowers solitary on slender pedicels about equaling the calyx in length, the upper usually 2 or 3 in a cluster on shorter pedicels; sepals 3–3.5 mm. long, lanceolate, glabrous and glaucous, the inner glandular-ciliate on the margin, the outer sparingly so or entire; petals yellow, 5–7 mm. long; capsule ovoid, about equaling the calyx.

Dry hillsides, Upper Sonoran Zone; Inner Coast Ranges, Solano County to San Benito County, California. Type locality: "Diablo Range, near Marsh's Ranch." May–June.

10. *Linum micranthum* A. Gray. Small-flowered Dwarf Flax. Fig. 2997.*Linum micranthum* A. Gray, Proc. Amer. Acad. 7: 333. 1868.*Hesperolinon micranthum* Small, N. Amer. Fl. 25: 85. 1907.

Stems slender, 2–4 dm. high, dichotomously branching above, the branches ascending or spreading, pubescent at least just above the forks. Leaves 15–25 mm. long, linear, entire, more or less involute; pedicels filiform, 5–15 mm. long, often curved; sepals ovate-lanceolate, 2 mm. long, the outer entire or very sparsely glandular-ciliate, the inner glandular-ciliate; petals white tinged with pink, 2–3.5 mm. long; appendages obscure or wanting; capsule ovoid, scarcely 2 mm. long.

Dry rocky slopes and ridges, Upper Sonoran and Arid Transition Zones; Blue and Cascade Mountains, Oregon, south to southern California. Type locality: Mount Bullion, Mariposa County, California. May–July. Little White Flax.

2990. *Linum Lewisii*2991. *Linum puberulum*2992. *Linum digynum*2993. *Linum drymarioides*2994. *Linum adenophyllum*2995. *Linum Clevelandii*

11. *Linum spergulinum* A. Gray. Slender Dwarf Flax. Fig. 2998.*Linum spergulinum* A. Gray, Proc. Amer. Acad. 7: 333. 1868.*Hesperolinon spergulinum* Small, N. Amer. Fl. 25: 86. 1907.

Stems slender, 1.5–4 dm. high, dichotomously branching above, the ultimate branches filiform, pubescent above the forks. Leaves linear, 1–2 cm. long, entire, somewhat involute; bracts similar but smaller; pedicels filiform, often 10–15 mm. long, straight or the tips curved upward; sepals narrowly ovate-lanceolate, at least the inner glandular-ciliate; petals white tinged with rose-pink, 5–7 mm. long, distinctly 2-lobed at base, the lobes somewhat thickened and rounded; capsules about 2.5 mm. long, exceeding the sepals.

Dry rocky ridges and grassy slopes, Upper Sonoran Zone; California Coast Ranges, from Mendocino County to Napa and Santa Clara Counties. Type locality: Cloverdale, Sonoma County. June–July.

12. *Linum californicum* Benth. California Dwarf Flax. Fig. 2999.*Linum californicum* Benth. Pl. Hartw. 299. 1848.*Hesperolinon californicum* Small, N. Amer. Fl. 25: 86. 1907.

Stems 1–4 dm. high, glabrous and glaucous, dichotomously branched, the branches mostly ascending. Leaves narrowly linear, 1–3 cm. long, involute, entire; pedicels short and the flowers usually in few-flowered cymes terminating the branches; pedicels mostly less than 5 mm. long; sepals lanceolate-acuminate, becoming 4–5 mm. long; irregularly glandular-ciliate; petals tinged with pink, 4–6 mm. long; capsule broadly ovoid, 3 mm. long.

Open gravelly soils, Upper Sonoran Zone; foothills of the Sierra Nevada and the Inner Coast Ranges surrounding the Sacramento Valley, California. Type locality: probably in the foothills of Butte County. April–June.

13. *Linum congestum* A. Gray. Marin Dwarf Flax. Fig. 3000.*Linum congestum* A. Gray, Proc. Amer. Acad. 6: 521. 1865.*Hesperolinon congestum* Small, N. Amer. Fl. 25: 86. 1907.*Linum californicum* var. *congestum* Jepson, Man. Fl. Pl. Calif. 587. 1925.

Stems 1–3 dm. high, glaucous and more or less pubescent, especially immediately above the forks; branches dichotomous, ascending, in the typical form rather short and forming a congested inflorescence; pedicels short; sepals lanceolate, 3 mm. long, pubescent on the back and at least the inner glandular-ciliate on the margins; petals white, tinged with pink, 5–6 mm. long; capsule ovoid.

Rocky and gravelly soils, Upper Sonoran Zone; San Francisco Bay region, California. Type locality: Marin County. April–June.

Linum congestum var. *confertum* A. Gray ex Trelease, Trans. St. Louis Acad. 5: 19. 1887. Differs from the typical species in having more elongated and open branching, with the flowers in few-flowered glomerules at the ends of the branches. About the same range as the species, but apparently more common. Type locality: Mare Island, Solano County, California.

Family 74. ZYGOPHYLLACEAE.

CALTROP FAMILY.

Herbs, shrubs or some tropical species trees, often strong-scented, the branches usually articulate at the nodes. Leaves generally opposite, pinnate or digitately 2–3-foliate, the leaflets entire. Stipules persistent. Flowers perfect, regular or nearly so, borne on axillary peduncles. Sepals usually 5, distinct or united at the base. Petals as many as the sepals or sometimes absent. Stamens as many as the petals or 2 or 3 times as many, the alternate ones sometimes longer; filaments often with a scale near the middle. Ovary 4–12-celled; ovules 1 to many in each cell; style terminal, with usually a simple stigma. Fruit an angled capsule or splitting into several smooth or spinescent nutlets, or in some species drupaceous. Seeds with or without endosperm; embryo straight or curved.

A family of about 20 genera and 150 species widely distributed in warm temperate and tropical regions.

Flowers purple; stipules spiny; leaflets palmately 1–7-foliate.

1. *Fagonia*.

Flowers yellow; stipules not spiny; leaves pinnate.

2. *Larrea*.

Shrub; fruit densely villous.

Herbs; fruit spiny or tubercled.

Fruit spiny, splitting into five 3–5-seeded nutlets.

3. *Tribulus*.

Fruit not spiny, often tubercled, splitting into ten to twelve 1-seeded nutlets.

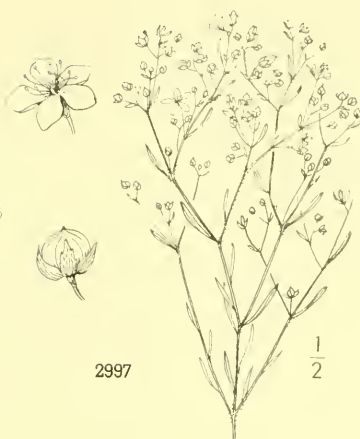
4. *Kallstroemia*.

1. FAGONIA [Tourn.] L. Sp. Pl. 386. 1753.

Diffusely branched plants with a woody base, the stems angled and channeled, glabrous or glutinous. Leaves opposite, 1–7-foliate, palmately divided, the leaflets entire, more or less spinose-tipped. Stipules subulate, spinulose-tipped. Flowers solitary, purple. Sepals 5, imbricate, caducous. Petals 5, clawed, caducous. Stamens 10, inserted on an incon-



2996



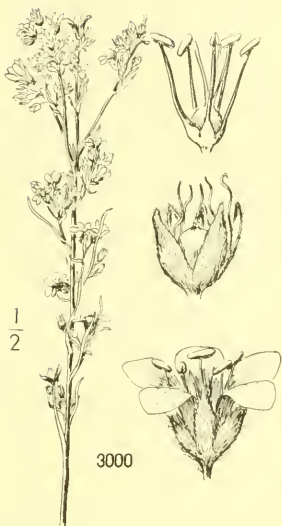
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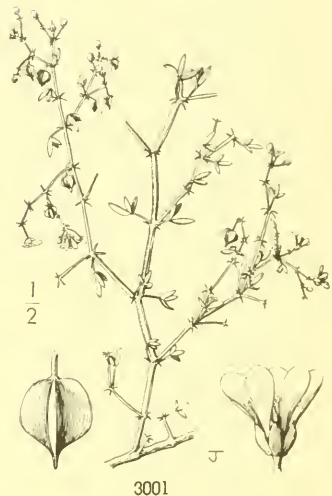
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3002



3003



3004

2996. *Linum Breweri*
2997. *Linum micranthum*
2998. *Linum spergulinum*

2999. *Linum californicum*
3000. *Linum congestum*
3001. *Fagonia californica*

3002. *Larrea glutinosa*
3003. *Tribulus terrestris*
3004. *Kallstroemia californica*

spicuous disk. Ovary 5-celled, with 2 ovules in each cell; style subulate; stigma simple. Fruit ovoid, deeply 5-angled, separating into five 1-seeded carpels which dehisce along the inner edge. Seeds erect, broadly oblong and flattened; endosperm bony. [Name in honor of G. C. Fagon, a French botanist of the seventeenth century.]

A genus of about 18 species, natives of southern Asia, southern Europe, Africa, Chile, Mexico, and California. Type species, *Fagonia cretica* L.

1. *Fagonia californica* Benth. California Fagonia. Fig. 3001.

Fagonia californica Benth. Bot. Sulph. 10. 1844.

Fagonia laevis Standley, Proc. Biol. Soc. Wash. 24: 249. 1911.

Fagonia cretica var. *californica* Engler, Veg. der Erde 9: 731. 1915.

Fagonia chilensis var. *laevis* I. M. Johnston, Proc. Calif. Acad. IV. 12: 1051. 1924.

Stems diffusely and divaricately branched, 2-6 dm. high, glabrous and minutely spinulose on the angles. Leaves 3-foliolate, short-petioled; leaflets lanceolate, the lateral ones oblique, 1-8 mm. long, glabrous or nearly so; sepals lanceolate, spinulose-tipped, 4-5 mm. long; petals spatulate, 5-8 mm. long.

Rocky or gravelly ridges, Lower Sonoran Zone; Colorado Desert, and near the Mexican Boundary south of San Diego, California, south to Sonora and central Lower California. Type locality: Magdalena Bay, Lower California. Jan.-June.

Fagonia californica var. *glutinosa* Vail, Bull. Torrey Club 22: 225. 1895. (*Fagonia chilensis* var. *glutinosa* I. M. Johnston, Proc. Calif. Acad. IV. 12: 1051. 1924.) Stems mostly prostrate, stouter, beset, especially above, by conspicuous subsessile yellowish glands; leaflets larger, the middle one often rhomboidal, 1-2 cm. long. Sandy or rocky situations, Lower Sonoran Zone; northern borders of the Colorado Desert, Riverside County, California, south to Sonora and Lower California. Type locality: Sonora.

2. *LÁRREA* Cav. Anal. Hist. Nat. 2: 119. *pl.* 18. 1800.

Evergreen strong-scented resinous shrubs. Leaves of a single pair of leaflets, these sessile by the broad base on the rachis and simulating a 2-lobed leaf. Peduncles interstipular, 1-flowered. Sepals 5, caducous. Petals 5, clawed, yellow. Stamens 10, inserted on the base of the small 10-lobed disk; filaments with a laciniate scale at the base. Ovary 5-celled, about 6 ovules in each cell; styles united; stigmas 5. Fruit obovoid or globose, densely white-hirsute, at length separating into five 1-seeded indehiscent nutlets. [Name in honor of J. A. de Larrea, Spanish patron of science.]

A genus of 2 or 3 species, natives of the southwestern United States, Mexico, and South America. Type species, *Larrea nitida* Cav.

1. *Larrea glutinosa* Engelm. Creosote Bush. Fig. 3002.

Zygophyllum californicum Torr. & Frem. in Frem. Second Rep. 257, 1845. (Hyponym.)

Larrea glutinosa Engelm. in Wisliz. Mem. Tour North. Mexico 93. 1848.

Covillea glutinosa Rydb. N. Amer. Fl. 25: 108. 1910.

Larrea tridentata var. *glutinosa* Jepson, Man. Fl. Pl. Calif. 604. 1925.

Schroeterella glutinosa Briq. Veroff. Geobot. Inst. Rüb. 3: 664. 1925.

Neoschroetera glutinosa Briq. Candollea 2: 514. 1926.

A much-branched shrub, 1-2 m. high, very leafy, the branches marked by black bands at the joints, young branchlets silky-pubescent. Leaflets obliquely lanceolate, curved, 5-10 mm. long, thick, coriaceous, dark yellowish green and resinous, silky-pubescent, becoming glabrate; petals spatulate, oblong, twisted, 6-8 mm. long; fruit subglobose, 4-5 mm. broad, densely hirsute.

A characteristic and common shrub of the Lower Sonoran Zone; Mojave Desert, California to southern Utah and south through the desert regions to western Texas and northern Mexico. Type locality: Olla and Fra Cristobal, New Mexico. March-June.

This species is referred by some botanists to the closely related Chilean species, *Larrea divaricata* Cav.

3. *TRÍBULUS* [Tourn.] L. Sp. Pl. 386. 1753.

Diffusely branching prostrate herb, with pubescent stems. Leaves opposite, pinnate, the alternating pairs of leaflets usually reduced or abortive. Stipules membranaceous. Flowers solitary on axillary peduncles. Sepals 5, early deciduous. Petals 5, yellow or rarely white. Stamens 10, hypogynous, the filaments filiform, naked. Ovary 5-celled, surrounded at the base by a 10-lobed disk; styles united, stout; stigmas 5. Fruit depressed, 5-angled, spinose, separating at maturity into five 3-5-seeded, bony nutlets. Seeds oblong-ovate; endosperm none. [Name Latin, from the Greek *tribolos*, a pronged instrument thrown on the ground to impede cavalry. Applied by the ancients to the genus *Trapa*.]

A genus of about 12 species, natives of the warm temperate and tropical regions. Type species, *Tribulus terrestris* L.

1. *Tribulus terrestris* L. Land Caltrop or Puncture Weed. Fig. 3003.

Tribulus terrestris L. Sp. Pl. 387. 1753.

Annual, the stems much branched from the base, prostrate or ascending, 2-5 dm. long, pubescent. Leaflets 5-8 pairs, oblong, inequilateral, 6-15 mm. long; petals oblong, 2-4 mm. long,

yellow; segments of the fruit with 2 long stout spines, 2 shorter ones and a row of very short ones forming a dorsal crest.

A fugitive from Europe, and becoming a troublesome weed in many parts of the Sacramento and San Joaquin Valleys and in southern California. March-June.

Zygophyllum Fabago L. Sp. Pl. 385. 1753. Syrian Bean-caper. Much-branched erect herb with deep lignescens root, glabrous. Leaves opposite, 2-foliolate; leaflets thick, obovate, 1-4 cm. long; flowers copper or yellow; capsule suggesting a legume, 10-12 mm. long, winged. Introduced from southwest Asia, and escaped locally in the Sacramento and San Joaquin Valleys, and Mojave Desert, California.

4. *KALLSTROËMIA* Scop. Introd. 212. 1777.

Annual herbs with diffusely branching, spreading or prostrate stems. Leaves opposite, abruptly pinnate, one of each pair alternately smaller or wanting; leaflets oblique. Stipules subulate. Flowers solitary on axillary peduncles. Sepals 5 or 6; marcescent. Petals 4-6, yellow or white, caducous. Stamens 10 or 12, hypogynous; the filaments opposite the petals adnate to them, the others shorter and subtended externally by a small gland. Ovary 8-12-celled, without transverse septa; styles united; stigma capitate. Fruit 8-12-angled, more or less tuberculate or roughened, separating at maturity into 8-12 bony, 1-seeded or rarely 2-seeded nutlets. Seeds obovate, with a membranaceous testa. [Meaning of name not clear but thought by some to be derived from the Greek *καλός*, beautiful, and *Stroemia*, a genus of the *Capparidaceae*.]

A genus of about 15 species, southwestern United States to tropical South America, West Indies, and Australia. Type species, *Tribulus maximus* L.

1. *Kallstroemia californica* (S. Wats.) Vail. California *Kallstroemia*. Fig. 3004.

Tribulus californicus S. Wats. Proc. Amer. Acad. 11: 125. 1876.

Kallstroemia californica Vail, Bull. Torrey Club 22: 230. 1895.

Stems diffusely branching, decumbent, 1-4 dm. long, pubescent or somewhat hirsute with whitish hairs when young, becoming glabrate. Leaves 2-5 cm. long; leaflets 5-7 pairs, 5-10 mm. long, elliptic, hoary-pubescent; peduncles shorter than the leaves; sepals 3-4 mm. long, lanceolate; petals yellow, about equaling the sepals, obovate; fruit strigose; carpels 8-10, with pointed tubercles on the back, the inner faces nearly smooth; beak shorter than the carpels, obtuse, glabrous.

Light sandy or gravelly soils; Lower Sonoran Zone; Mojave and Colorado Deserts, southern California to Arizona, eastern Lower California, Sonora, and Sinaloa. Type locality: Lower California, on the east side of the peninsula. June-Sept.

Kallstroemia grandiflora Torr. ex A. Gray, Smiths. Contr. 3⁵: 28. 1852. Stems diffusely branched, decumbent or suberect, 2-5 dm. long, angled, hirsute with twisted hairs, interspersed with longer cilia. Leaves 2-7 cm. long; leaflets 5-9 pairs, obliquely oblong, 8-15 mm. long, ciliate, pubescent or glabrate beneath; sepals linear-lanceolate, 8-15 mm. long; petals 12-25 mm. long, obovate, deep yellow; fruiting carpels 10, pubescent, tuberculate on the back, the inner faces reticulate. Sandy or gravelly desert washes; Lower Sonoran Zone; southwestern Arizona to Texas and Colima. Type locality: borders of the Gila River, Arizona. To be expected on the California deserts.

Family 75. *RUTACEAE*.

RUE FAMILY.

Aromatic trees or shrubs, or sometimes herbaceous or scandent, with punctate glands. Leaves alternate or opposite, pinnately or palmately compound or simple; petioles often winged. Flowers perfect, polygamous or dioecious, in an axillary or terminal inflorescence. Calyx of 3-5 sepals or lobes, or rarely wanting. Petals 3-5 or rarely more, usually imbricate. Stamens as many or twice as many as petals, the filaments distinct or united below, inserted on a hypogynous disk. Pistil of 1-5 distinct or united carpels; styles distinct or connate; stigma simple or lobed. Ovules 2 or rarely more in each cell. Fruit various, often a berry. Seeds 1 to many in each cell, with or without endosperm.

A family of about 110 genera and 900 species, mainly tropical and most abundant in South America and Australia.

Fruit a samara or 2-lobed capsule; leaves alternate.

Leaves compound; fruit a samara, winged all around.

Leaves simple; fruit a 2-lobed capsule.

Fruit a berry; leaves opposite, simple.

1. *Ptelea*.

2. *Thamnosma*.

3. *Cnecoridium*.

1. *PTELEA* L. Sp. Pl. 118. 1753.

Shrubs or small trees, unarmed, the bark bitter. Leaves deciduous, 3-5-foliolate, the leaflets entire or serrulate, punctate and ill-smelling. Inflorescence of corymbose or panic-

ulate cymes. Flowers polygamous, greenish white. Calyx-lobes 4 or 5, imbricate. Petals 4 or 5, longer than the calyx-lobes. Stamens as many as petals and alternate with them, the filaments hairy on the inner side, present in the pistillate flower but not fertile. Ovary compressed, 2-celled or rarely 3-celled; ovules 2 in each cell. Fruit a samara, with a reticulate wing completely encircling the body. [Greek name of the elm, which has similar fruit.]

A genus of 3 species, native of the United States and Mexico. The foliage is variable, which has led some authorities to recognize a much larger number of species. Type species, *Ptelea trifoliata* L.

1. *Ptelea crenulata* Greene. Western Hop-tree. Fig 3005.

Ptelea crenulata Greene, Pittonia 1: 216. 1888.

Ptelea Baldwinii var. *crenulata* Jepson, Fl. W. Mid. Calif. 249. 1901.

Small tree, 3-5 m. high, the young twigs pubescent. Leaves somewhat pubescent, glabrate in age; leaflets 3, rarely 5, elliptical to ovate or especially the terminal one often obovate, 2-6 cm. long, more or less crenate; petals 4-6 mm. long; filaments hairy only near the base; samara 1-2 cm. long, fully as broad, the wing emarginate at both ends; style persistent.

Canyons and bottomlands, Upper Sonoran Zone; Inner Coast Ranges and Sierra foothills from Shasta County to Tulare and Santa Clara Counties, California. Type locality: no definite locality given in the original description. April-June.

2. *THAMNÓSMA* Torr. & Frem. in Frem. Second Rep. 313. 1845.

Small, strong-scented, glandular, desert shrubs. Leaves simple, alternate, entire, sometimes reduced to scales. Flowers in racemes or racemose cymes, perfect. Sepals and petals 4. Stamens 8, inserted on the cup-like disk. Ovary 2-celled, deeply 2-lobed, stipitate; style filiform; stigma capitate; ovules 5 or 6 in each cell. Fruit a leathery capsule, 2-lobed, dehiscent at the apex. Seeds reniform. [Name Greek, meaning bush and odor, in reference to the strong odor of these plants.]

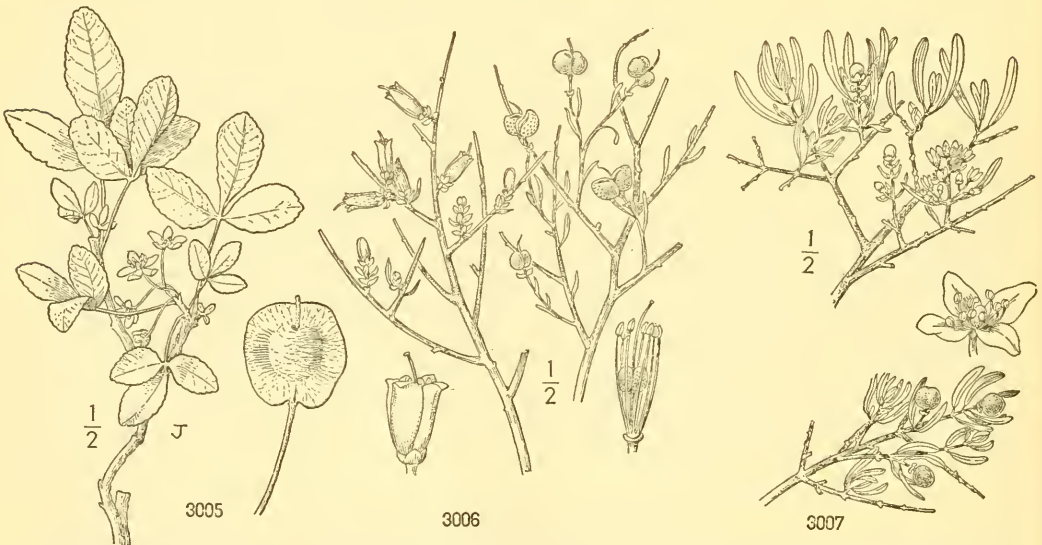
A genus of 2 species inhabiting the arid southwestern United States and northern Mexico. Type species, *Thamnosma montana* Torr. & Frem.

1. *Thamnosma montana* Torr. & Frem. Turpentine Broom. Fig. 3006.

Thamnosma montana Torr. & Frem. in Frem. Second Rep. 313. 1845.

Strong-scented shrub, 3-5 dm. high, the stems freely branching, broom-like, yellowish green and thickly beset with pustulate glands. Leaves 2-10 mm. long, oblanceolate, or linear, few and early deciduous; flowers in loose terminal racemes, 8-12 mm. high; petals dark purple, erect; fruit distinctly stipitate, deeply parted into 2 nearly globose lobes; seeds dark brown, smooth or slightly wrinkled.

Sandy or rocky ridges, Lower Sonoran Zone; Mojave and Colorado Deserts, California to southern Utah, Arizona, New Mexico, Sonora, and Lower California. Type locality: Virgin River, southeastern Nevada. March-May.



3005. *Ptelea crenulata*

3006. *Thamnosma montana*

3007. *Cneidium dumosum*

3. *CNEORÍDIUM* Hook. f. in Benth. & Hook. Gen. Pl. 1: 312. 1862.

Evergreen, heavy-scented shrubs, with glabrous branchlets. Leaves opposite or fascicled on short branchlets, pellucid-punctate. Flowers perfect, solitary or somewhat corymbose on axillary or terminal peduncles. Sepals 4, persistent. Petals 4, spreading. Stamens 8, those opposite the petals shorter, inserted around the base of the flat, toothed disk. Ovary 1-celled, sessile; ovules 2, collateral; style nearly basal, curved; stigma capitate. Berry globose or ovoid, 1-2-seeded, the exocarp punctate. Seeds nearly globose, dark brown; embryo curved. [Name Greek, meaning resembling *Cneorum*, an Old World genus.]

A monotypic genus of southern California and Lower California.

1. *Cneoridium dumosum* (Nutt.) Hook. f. Bush Rue. Fig. 3007.

Pitavia dumosa Nutt. in Torr. & Gray, Fl. N. Amer. 1: 215. 1838.

Cneoridium dumosum Hook. f. ex Baillon, Hist. Pl. 4: 498. 1873.

A much-branched shrub, 5-15 dm. high, glabrous throughout. Leaves narrowly oblong or spatulate-linear, 15-25 mm. long, sessile, thick, entire or obscurely crenulate, punctate along the margin; sepals 1 mm. long; petals white, 5-6 mm. long, oval or obovate; fruit reddish brown, 5-6 mm. in diameter.

On dry chaparral-covered mesas and hills, Lower Sonoran Zone; Laguna Beach, Orange County, to western San Diego County, California, and northern Lower California. Type locality: San Diego, California. Jan.-March.

Ruta chalapensis L. Mant. 69. 1767. African Rue. Strong-smelling glaucous perennial herb, the stems erect, 4-8 dm. high. Leaves bi- or tripinnate; leaflets oblong-oblancoate, 5-15 mm. long; flowers corymbose; calyx 4-parted; petals 4, yellow, 6-8 mm. long, involute, fringed; capsule 4-lobed. An occasional escape from cultivation in southern California. Native of the Mediterranean region.

Family 76. SIMAROUBACEAE.

QUASSIA FAMILY.

Trees or shrubs, usually with bitter bark containing oil sacs. Leaves alternate or opposite, simple or compound. Stipules minute or none. Flowers perfect or unisexual, axillary, paniculate or racemose. Calyx of 3-7 distinct or partly united sepals. Petals as many as sepals, or rarely wanting. Stamens as many as sepals or twice as many, or rarely numerous. Pistil of 2-5 distinct or united carpels; styles distinct or united, or none; ovules 1 to many in each cell. Fruit a berry, drupe, capsule or samara. Seeds usually solitary; endosperm present or sometimes wanting.

A family of 30 genera and 125 species, native of warm temperate and tropical regions. Closely related to the *Rutaceae* from which it is best distinguished by the absence of punctate glands in the leaves.

Unarmed tree; leaves pinnate; fruit a samara.

Very thorny shrub; leaves scale-like; fruit drupe-like.

1. *Ailanthus*.

2. *Holacantha*.

1. *AILÁNTHUS* Desf. Mém. Acad. Paris 1786: 265. pl. 8. 1789.

Polygamo-dioecious trees, with large odd-pinnate leaves. Flowers small, greenish white, in terminal panicles. Calyx 5-cleft, the lobes imbricated. Petals 5, spreading, valvate. Disk 10-lobed. Staminate flowers with 10 stamens inserted at the base of the disk. Pistillate with 2 or 3 stamens and a deeply 2-5-cleft ovary, the divisions flat, 1-celled. Ovules 1 in each cell. Fruit a samara, linear or oblong, 1-seeded at the middle. [Name from the Chinese, meaning tree of heaven.]

A genus of 3 species, native of China and the East Indies. Type species, *Toxicodendron altissima* Mill.

1. *Ailanthus altissima* (Mill.) Swingle. Tree of Heaven. Fig. 3008.

Toxicodendron altissima Mill. Gard. Dict. ed. 8. no. 10. 1768.

Albonia peregrina Buchoz, Herb. Color. Amér. pl. 57. 1783.

Ailanthus glandulosa Desf. Mém. Acad. Paris 1786: 265. 1789.

Ailanthus altissima Swingle, Journ. Wash. Acad. 6: 495. 1916.

Ailanthus peregrina Barkley, Ann. Mo. Bot. Gard. 24: 264. 1937.

Tree with smooth gray bark. Leaves deciduous, 3-10 dm. long; leaflets 11-41, lanceolate to obovate, 5-15 cm. long, entire or with a few coarse teeth toward the base; panicles 1-3 dm. long, petals 3-4 mm. long, ovate, greenish yellow, villous near the base on the inner surface; samaras 3-5 cm. long, somewhat spirally twisted.

Escaped from cultivation, and well established in many localities in the Pacific States. The staminate flowers are ill-smelling. Native of China. June.

2. *HOLACÁNTHA* A. Gray. Mem. Amer. Acad. II. 5: 310. 1854.

Almost leafless shrubs, with stiff thorn-like branchlets. Leaves few, scale-like, deciduous. Flowers dioecious, solitary or clustered on the branchlets. Sepals and petals 7 or 8. Stamens 12–16 in the staminate flowers, present but sterile in the pistillate. Disk annular, crenulate. Pistil composed of 6–10 slightly cohering carpels tipped by the diverging styles. Fruit of several dry stellately diverging drupes. Seed ovoid. [Name Greek, meaning complete and thorn.]

A monotypic genus of the arid southwestern United States and adjacent Mexico.

1. *Holacantha Emóryi* A. Gray. Crucifixion Thorn. Fig. 3009.

Holacantha Emoryi A. Gray. Mem. Amer. Acad. II. 5: 310. 1854.

A much-branched thorny shrub, 2–3 m. high, canescent when young, the thorn-like branchlets stout, terete, 5–15 cm. long. Leaves few, on mature plants reduced to small ovate or subulate scales, on seedlings 10–12 mm. long, linear or lanceolate, entire, repand or with a pair of basal lobes; flowers usually in dense clusters; petals, oblong to obovate, 4–5 mm. long, pubescent on the back; filaments pubescent below the middle; drupes obliquely ovoid, somewhat compressed, 6–8 mm. long.

Sandy or gravelly soils, Lower Sonoran Zone; rare in California, known stations are: 8 miles west of Ludlow, also at Amboy, Lavic, Dagget, and Goffs, all in southeastern Mojave Desert, and Hayfields, northern Colorado Desert, ranging eastward to Arizona and Sonora. Type locality: on the desert between the Gila River and Tucson, Arizona. April–July.

Family 77. BURSERACEAE.

TORCHWOOD FAMILY.

Aromatic trees or shrubs. Leaves alternate, simple or usually pinnate, deciduous, the rachis often winged. Flowers solitary or often paniculate, perfect or polygamodioecious. Calyx 3–5-cleft. Petals as many as the calyx-lobes, distinct or rarely united into a short tube. Stamens twice as many as petals; filaments naked. Disk annular. Ovary 4–5-celled; styles distinct, short; ovules usually 2 in each cell. Fruit drupe-like, containing 1–5 stones. Seeds with membranaceous testa; endosperm none.

A family of 19 genera and about 300 species, mainly tropical, in both hemispheres.

1. *BURSERA* Jacq. ex L. Sp. Pl. ed. 2. 471. 1762.

Trees or shrubs, with simple or once or twice compound leaves. Flowers solitary in the axils or paniculate, small, polygamous. Calyx-lobes 4 or 5, spreading, persistent. Petals distinct, well exceeding the calyx-lobes, inserted on the edge of the disk. Stamens 8–10. Ovary 3-celled. Fruit drupe-like, by abortion sometimes 1-celled, the epicarp splitting into 3 valves; stones covered with an aromatic pulp. [Name in honor of J. Burser, a botanist of the sixteenth century.]

An American genus of about 40 species, ranging from California and Mexico to the West Indies and tropical South America. The generic name, although a homonym and antedated by *Elaphrium* Jacq., has been conserved by the International Rules of Nomenclature. Type species, *Bursera gummiifera* L.

1. *Bursera microphylla* A. Gray. Small-leaved Elephant Tree or Torote.

Fig. 3010.

Bursera microphylla A. Gray, Proc. Amer. Acad. 5: 155. 1861.

Terebinthus microphylla Rose, Contr. U.S. Nat. Herb. 10: 120. 1906.

Elaphrium microphyllum Rose, N. Amer. Fl. 25: 250. 1911.

Small tree, the branches glabrous, becoming cherry-red in age. Leaves simply pinnate, the rachis narrowly winged; leaflets 7–33, linear-oblong, 4–8 mm. long, obtuse; flowers appearing before the leaves in 1–3-flowered clusters; calyx-lobes 1 mm. long, ovate; petals 4 mm. long; drupes glabrous, 3-angled, yellow, 6 mm. long.

Desert regions, Lower Sonoran Zone; locally occurring on the western borders of the Colorado Desert between Fish and Carrizo Creeks, California, and ranging from southern Arizona to Sonora and northeastern Lower California. Type locality: Sierra Tule, Sonora. June–July.

Melia Azédarach L. Sp. Pl. 384. 1753. China-berry or Umbrella Tree. Tree with large twice-pinnate leaves; leaflets ovate to ovate-lanceolate, acute, irregularly serrate or lobed; flowers purplish in large open panicles, petals oblanceolate or linear-oblong; fruit a nearly globular drupe about 1 cm. in diameter. The commonly cultivated form is the variety *umbraculiformis* with the numerous branches radiating from the trunk and giving the effect of a huge umbrella. Sometimes growing as an escape in California. Native of Asia, and a member of the family *Meliaceae*.

Family 78. **POLYGALACEAE.**

MILKWORT FAMILY.

Herbs, shrubs or rarely trees, often with glands in the leaf-tissue. Leaves alternate, opposite or whorled, simple, entire, without stipules. Flowers perfect, irregular, racemose, spicate or solitary, each subtended by a bract and 2 bractlets. Sepals 5, the two lateral (wings) usually much larger and petaloid. Petals 3 or rarely 5, hypogynous, the anterior one (keel) boat-shaped often with a terminal beak or crest, the two upper usually ligulate or oval, often united to the staminal sheath at base. Stamens usually 8, and generally with the filaments united into a sheath; anthers opening by a subterminal pore. Ovary 2-celled; style simple; stigma 2-lobed; ovules solitary in each cell, pendulous. Fruit a capsule, drupe or samara. Seeds usually pubescent, arillate; endosperm present; embryo straight, axial.

A family of 10 genera and approximately 1,000 species, widely distributed in temperate and tropical regions.

1. **POLÝGALA L. Sp. Pl. 701. 1753.**

Herbs, shrubs or trees, with alternate, opposite or whorled leaves. Flowers in terminal or axillary racemes, sometimes also cleistogamous and subterranean. Capsule compressed contrary to the partition, often margined or winged, loculicidally dehiscent or indehiscent. Seeds usually pubescent and arillate. [Name Greek, meaning much milk.]

About 450 species of wide geographic distribution; about 180 species occur in North America. Type species, *Polygala vulgaris* L.

Flowers 8–12 mm. long; keel beaked.

Plants not spinescent.

Capsule thin-walled, distinctly reticulate; aril with short rounded umbo; wings glabrous; basal racemes bearing cleistogamous flowers. 1. *P. californica*.

Capsule firm-walled, obscurely or not at all reticulate; aril with a conspicuous conical or cylindrical umbo; no basal racemes.

Flowers greenish yellow; wings conspicuously puberulent. 2. *P. cornuta*.

Flowers purplish; wings merely ciliate. 3. *P. Fishiae*.

Plants spinescent. 4. *P. subspinoso*.

Flowers 4–5.5 mm. long; keel beakless. 5. *P. acanthoclada*.

1. **Polygala californica Nutt. California Milkwort or Polygala. Fig. 3011.**

Polygala californica Nutt. in Torr. & Gray, Fl. N. Amer. 1: 671. 1840.

Polygala cucullata Benth. Pl. Hartw. 299. 1849.

Stems numerous from a slender woody root, slender, erect or spreading, 2–4 dm. long, somewhat puberulent with incurved hairs. Leaves elliptic to oval, 1–4 cm. long, obtuse, sparsely puberulent. Cleistogamous flowers usually present, near the bases of the stems. Normal flowers in few-flowered terminal racemes, rose and violet-purple; wings 10–12 mm. long, sparsely ciliate on the upper margins near the base, otherwise glabrous; beak of keel strongly papillose, 3 mm. long; capsule 6–7.5 mm. long, thin-walled and reticulate.

Usually in woods, Humid Transition Zone; Josephine County, Oregon, to Monterey County, California. Type locality: probably Monterey, California. May–July.

2. **Polygala cornuta Kell. Sierra Milkwort or Polygala. Fig. 3012.**

Polygala cornuta Kell. Proc. Calif. Acad. 1: 62. 1855.

Stems several to many from a stout woody root, shrubby, usually spreading and with ascending branches, 3–8 dm. high. Leaves narrowly elliptic-lanceolate to oval, 2–4 cm. long, obtuse or rounded at apex, sparsely puberulent; racemes rather dense, 2–4 cm. long; pedicels 2–5 mm. long; flowers yellowish white or greenish white; wings oval-obovate, 1 cm. long, densely puberulent; beak of keel 1.5–2 mm. long; capsule 8 mm. broad, firm-walled, scarcely reticulate.

Open coniferous forests, Arid Transition Zone; eastern Humboldt and Siskiyou Counties, south through the Sierra Nevada to Fresno County, California. Type locality: Placerville, California. June–Sept.

3. **Polygala Fishiae Parry. Fish's Milkwort or Polygala. Fig. 3013.**

Polygala Fishiae Parry, Proc. Davenport Acad. 4: 39. 1884.

Polygala cornuta var. *Fishiae* Jepson, Man. Fl. Pl. Calif. 594. 1925.

Slender shrub 1–1.5 m. high, the branchlets puberulent. Leaves linear to narrowly oblong or oblong-lanceolate, 15–45 mm. long, rounded at the apex, sparsely puberulent on the midvein above and on the margins, or often glabrous, pale green; racemes 2–10 cm. long, flowers few to many; sepals elliptic, 1.5–2 mm. long; wings rose-purple, 6–9 mm. long, obovate, finely ciliate, otherwise glabrous; keel yellow, 7–8 mm. long; beak slender, 0.7 mm. long; capsule sub-orbicular, 8 mm. broad, firm-walled, scarcely reticulate.

Shaded canyon slopes, Upper Sonoran Zone; Ventura County, California, south to Lower California. Type locality: near Sauzal, Todos Santos Bay, Lower California. June–Aug.



3008. *Ailanthus altissima*
 3009. *Holacantha Emoryi*
 3010. *Bursera microphylla*

3011. *Polygala californica*
 3012. *Polygala cornuta*
 3013. *Polygala Fishiae*

3014. *Polygala subspinoso*
 3015. *Polygala acanthoclada*
 3016. *Tetracoccus dioicus*

4. *Polygala subspinosa* S. Wats. Spiny Milkwort or *Polygala*. Fig. 3014.*Polygala subspinosa* S. Wats. Amer. Nat. 7: 299. 1873.*Polygala lasseniana* Heller, Leaflets West. Bot. 2: 230. 1940.

Low, much-branched shrub, 5–15 cm. high, the stems several to many from a stout woody caudex, pallid green, finely pubescent with spreading hairs or glabrate, the branches spiny-tipped. Leaves 1–2 cm. long, narrowly obovate to elliptic, narrow at the base, glabrous or sparsely puberulent, coriaceous; racemes 1–4-flowered, the axis indurate and spiny-tipped; bracts narrowly lanceolate, membranous and colored; pedicels 3–9 mm. long; sepals 4–6 mm. long; corolla rose-purple and yellow, glabrous; wing-petals obliquely ovate, 10 mm. long; keel with blunt porrect entire beak; capsule 6–7 mm. long, 4–5 wide, reticulate, sparsely hispidulous on the margin.

Dry desert hillsides, Upper Sonoran Zone; Lassen County, California, western Nevada to western Colorado, northern Arizona and northern New Mexico. Type locality: Silver City, Nevada. May–June.

Polygala subspinosa var. *heterorhyncha* Barneby, Leaflets West. Bot. 3: 194. 1943. Habit much the same as the typical species; beak of the keel emarginate on the lower side at about the middle with a deep rounded notch. Chloride Cliff, Death Valley, California, and in the Spotted Range, Nye County, Nevada, the type locality.

5. *Polygala acanthoclada* A. Gray. Desert Milkwort or *Polygala*. Fig. 3015.*Polygala acanthoclada* A. Gray, Proc. Amer. Acad. 11: 73. 1876.

Low shrub, 1 m. high or less, intricately divergent-branched, branches densely pilose, canescent, the branchlets indurate and ending in a sharp spiny tip. Leaves spatulate to linear-spatulate, 6–15 mm. long, puberulent with incurved spreading hairs; racemes 2–3-flowered; flowers yellowish; wings obovate or oval, rounded at base, 4–5 mm. long, glabrous; keel not beaked; capsule oval, 4.5–5 mm. broad; aril apical, 1 mm. long.

Desert ranges, Upper Sonoran Zone; Providence Mountains, California, and western Nevada to southern Colorado and northwestern Arizona. Type locality: San Juan Valley, Colorado. June–July.

Family 79. EUPHORBIACEAE.*

SPURGE FAMILY.

Monoecious or dioecious trees, shrubs or herbs with milky or acrid juice. Leaves simple, alternate or opposite, entire, toothed or lobed. Stipules present or absent. Flowers usually apetalous, often without a calyx. Stamens few to many, anthers 2-celled, filaments free or united. Ovary 3–4-celled, more rarely 1- to many-celled. Ovules 1–2 in each cell; styles equaling the number of cells, simple or variously divided. Fruit various, in ours usually a 3-lobed capsule separating into 2-valved carpels from a persistent axis. Seeds fleshy or oily.

About 250 genera and 4,500 species of wide geographical distribution, mainly in tropical and subtropical regions.

Flowers not subtended by an involucre simulating a calyx; perianth present in the staminate flowers, present or absent in the pistillate flowers.

Ovules 2 in each cell; shrubs.

Ovules 1 in each cell; herbs or shrubs.

Leaves entire, crenate or dentate, not palmately lobed; capsules glabrous or pubescent.

Stamens united in a column; petals present (in ours) in both staminate and pistillate flowers.

Stamens free; petals absent in both staminate and pistillate flowers.

Herbage of stellate or scale-like hairs.

Ovary 1-celled; plants annual; pistillate flowers without calyx.

Ovary 3-celled; plants perennial herbs or shrubs; pistillate flowers with calyx.

Seeds carunculate; leaves entire; herbs (sometimes woody at base).

Seeds ecarunculate; leaves crenate; shrubs.

Herbage glabrous or of simple hairs.

Herbage of simple hairs.

Stigma-lobes finely dissected; plant without stinging hairs.

Stigma-lobes simple; plants with stinging hairs.

Herbage glabrous.

Leaves palmately lobed; capsule usually spiny.

Pistillate and staminate flowers surrounded by one involucre simulating a calyx; perianth none or present as a single scale.

1. *Tetracoccus*.3. *Ditaxis*.2. *Eremocarpus*.4. *Croton*.5. *Bernardia*.6. *Acalypha*.7. *Tragia*.8. *Stillingia*.9. *Ricinus*.10. *Euphorbia*.

1. TETRACÓCCUS Engelm. ex Parry, W. Amer. Sci. 1: 13. 1885.

Dioecious shrubs with opposite or alternate, sometimes fascicled, leaves. Staminate flowers in clusters, apetalous; sepals 4–10; stamens 4–9, surrounding the lobed disk. Pistillate inflorescence solitary; flowers apetalous, with disk; calyx 6–10-parted. Ovary 3–4-celled, the cells 2-ovuled; styles 3–4, entire, linear or dilated at apex. Capsule lobed,

*Text, except the genus *Euphorbia*, contributed by Roxana Stinchfield Ferris.

separating in age from the central column. Seeds shining, strophiolate, 1-2 in each cell. [Name Greek, meaning four and fruit.]

A genus of 5 species, natives of Mexico and southwestern United States. Type species, *Tetracoccus dioicus* Parry.

Capsule 4-celled; branches not rigidly divaricate.

Leaves linear, entire.

Leaves ovate, margins toothed.

Capsule usually 3-celled; branches rigidly divaricate.

1. *T. dioicus*.

2. *T. ilicifolius*.

3. *T. Hallii*.

1. *Tetracoccus dioicus* Parry. Parry's *Tetracoccus*. Fig. 3016.

Tetracoccus dioicus Parry, W. Amer. Sci. 1: 13. 1885.

Tetracoccus Engelmannii S. Wats. Proc. Amer. Acad. 20: 373. 1885.

Erect branching shrub, 0.5-3 m. high, with slender grayish branches and reddish branchlets. Leaves linear, 1.5-3 cm. long, cuneate or rounded at the base, subsessile or with a short petiole; staminate inflorescence reddish, of axillary clusters shorter than the leaves, the flowers 2-8, on slender pedicels 0.5-8 mm. long; staminate calyx 1 mm. long; stamens 3-4.5 mm. long, the filaments hairy; pistillate flowers solitary, pedicellate, the calyx 2.5-5 mm. long; capsule 4-lobed, 8-10 mm. long; seeds smooth.

In chaparral, Upper Sonoran Zone; western San Diego County, California, south to northern Lower California. Type locality: Table Mountain, Lower California. March-April.

2. *Tetracoccus ilicifolius* Cov. & Gilman. Holly-leaved *Tetracoccus* or Shrubby Spurge. Fig. 3017.

Tetracoccus ilicifolius Cov. & Gilman, Journ. Wash. Acad. 26: 531. 1936.

Branched shrub, 0.3-1.3 m. high with gray glabrous branches. Leaves subsessile, coriaceous, ovate, the margins more or less toothed, pilose with brownish hairs when young, becoming glabrate; staminate inflorescence pedunculate, hairy, the flowers many, clustered in the axils of bracts; stamens 7-9; pistillate flowers solitary in the axils of the leaves; pedicels 8-10 mm. long, persistent; capsule glabrous, 4-celled, 7-8 mm. long; seeds smooth.

In canyons, Lower Sonoran Zone; Grapevine and Panamint Mountains, Inyo County, California. Type locality: Grapevine Mountains. April-June.

3. *Tetracoccus Hallii* Brandg. Hall's Shrubby Spurge or Purple-bush. Fig. 3018.

Tetracoccus Hallii Brandg. Zoe 5: 229. 1906.

Securinega Hallii I. M. Johnston, Univ. Calif. Pub. Bot. 7: 442. 1922.

Securinega fasciculata var. *Hallii* Jepson, Man. Fl. Pl. Calif. 595. 1925.

Halliophytum Hallii I. M. Johnston, Contr. Gray Herb. No. 68: 88. 1923.

Divaricately branching, grayish-stemmed shrubs with spinescent twigs, 0.5-2 m. high. Leaves glabrate, many, fasciculate, oblanceolate, 4-10 mm. long; staminate flowers several in leaf-axils, with slender pedicels 4-6 mm. long; sepals 6, less than 0.5 mm. long; pistillate flowers solitary, sessile or with stout pedicels 2-3 mm. long; stamens 4-6, filaments free, 1.5-2 mm. long; capsule pubescent when young, globose-oblong, 6-8 mm. long.

On dry slopes, Lower Sonoran Zone; Colorado Desert, California, and adjacent Arizona. Type locality: Chuckwalla Bench, Riverside County, California. April-May.

2. EREMOCARPUS Benth. Bot. Sulph. 53. 1844.

Stellate-pubescent glandular and heavy-scented annual herbs, with alternate, entire, 3-nerved, petiolate, exstipulate leaves, and monoecious apetalous flowers in axillary cymes. Calyx 5-6-parted, slightly imbricate in the staminate flowers, wanting in the pistillate. Stamens 6-7, central on the hairy receptacle; filaments exerted. Ovary with 4-5 small glands at the base, 1-celled, 1-ovuled; style simple, filiform, stigmatic at the apex. Capsule obovoid-oblong, 2-valved. Seed smooth and shining; endosperm fleshy. [Name Greek, meaning solitary fruit.]

Monotypic genus of western America. Type species, *Croton setigerus* Hook.

1. *Eremocarpus setigerus* (Hook.) Benth. Turkey Mullein. Fig. 3019.

Croton setigerus Hook. Fl. Bor. Amer. 2: 141. 1838.

Eremocarpus setigerus Benth. Bot. Sulph. 53. 1844.

Piscaria setigera Piper, Contr. U.S. Nat. Herb. 11: 352. 1906.

Annual, strong-scented herbs, 0.5-2 dm. high, dichotomously branching from the base, forming mats, herbage densely stellate-pubescent throughout with simple spreading hispid hairs on stems and leaf-margins. Leaves ovate to rhombic-ovate, 1.5-5 cm. long, on slender petioles about the same length, crowded at the ends of the branches; pistillate flowers 1-3, sessile, in axils of upper branches, without calyx; staminate flowers 1.2-2 mm. long on slender pedicels 3 mm. long;

sepals 5-6, obtuse, surpassed by filaments; capsule 4 mm. long; seed 4 mm. long, shining, mottled.

Dry hills and plains, often found in cultivated areas, Upper Sonoran Zone; Klickitat County, Washington, to northern Lower California. Type locality: Columbia River near the mouth of the Willamette. June-Sept.

3. *DITÁXIS* Vahl ex Juss. Euphorb. 27, 110. 1824.

Monoecious or rarely dioecious annual or perennial herbs, often woody below. Leaves alternate, entire or toothed, pubescence when present in ours mostly of coarse appressed malpighiaceus hairs. Inflorescence axillary, racemose, bracteate, pistillate flower usually 1, basal, staminate above. Sepals of staminate flowers 5; petals 5, equaling or surpassing the stamens; glands of disk opposite sepals. Sepals of the pistillate flowers 5, somewhat elongated in age; petals 5, equaling or shorter than the sepals; glands opposite the sepals, short, often petaloid. Stamens 5 or 10, united in a column, arranged in 2 ranks, the third rank if present sterile. Styles 3, once or twice cleft. Capsule 3-lobed, 1 seed in each cavity. [Name Greek, meaning double-ranked, referring to stamens.]

About 43 species, natives of temperate and tropical regions of North and South America. Type species, *Ditaxis fasciculata* Vahl.

Bracts and pistillate calyces conspicuously fimbriate-glandular; pubescence of the upper stems of short, soft, spreading hairs, with few or no appressed setose hairs.

1. *D. adenophora*.

Bracts and pistillate calyces not conspicuously fimbriate-glandular; upper stems mainly with appressed setose hairs, or glabrous.

Stigma-lobes broadly dilated; low shrubs.

2. *D. lanceolata*.

Stigma-lobes linear or subclavate; annuals or short-lived perennials.

Pubescence of setose hairs mixed with appressed or crinkled pilose hairs; seeds globose-ovoid, nearly smooth, lightly marked with shallow reticulations.

3. *D. serrata*.

Pubescence when present of setose hairs only; seeds ovoid, faveolate, the depressions marked with minute radiating ridges.

Herbage hairy, usually densely so; pistillate petals more or less pilose.

4. *D. neomexicana*.

Herbage glabrous or with few hairs on the leaves; pistillate petals glabrous.

5. *D. californica*.

1. *Ditaxis adenophora* (A. Gray) Pax & K. Hoffmn. Glandular *Ditaxis*.

Fig. 3020.

Argythamnia adenophora A. Gray, Proc. Amer. Acad. 8: 294. 1870.

Ditaxis adenophora Pax & K. Hoffmn. Pflanzenreich 4^{147.v1}: 65. 1912.

Argythamnia Clariana Jepson, Fl. Calif. 2: 419. 1936.

Perennial branching herbs, more or less purplish, 3-4 dm. high with woody caudex, upper part of the stems finely pubescent with simple hairs. Leaves oblanceolate, 1.5-4.5 cm. long, veins prominent on the lower surface of the leaf, pubescence of short simple hairs, appressed setose hairs very sparse, margins rather finely serrate, usually with tack-shaped glands on the teeth; inflorescence congested, mostly with simple hairs; bracts 1-3 mm. long, narrowly triangular, margin with tack-shaped glands; staminate flowers 3-4 mm. long, with few or no stalked glands; petals longer than the sepals; pistillate sepals 4-6 mm. long, lanceolate, not white-margined, densely beset with marginal tack-shaped glands; pistillate petals clawed, ovate-lanceolate, sometimes lacinate, as long as or longer than the sepals; ovary with coarse setose hairs, becoming glabrate; style branches dilated at the tips; seeds irregularly and shallowly pitted, the surface roughened.

Desert slopes, Lower Sonoran Zone; rare, Coachella Valley, Colorado Desert, California, to southwestern Arizona and Sonora. Type locality: Sonora. April-Aug.

The plants of California and adjacent Arizona are less robust and more hairy than those of the typical form in Sonora. Also the tack-shaped glands of the leaves are shorter and less abundant.

2. *Ditaxis lanceolata* (Benth.) Pax & K. Hoffmn. Narrow-leaved *Ditaxis*.

Fig. 3021.

Serophyton lanccolatum Benth. Bot. Sulph. 52. 1844.

Argythamnia sericophylla A. Gray, Bot. Calif. 2: 70. 1880.

Ditaxis sericophylla Heller, Cat. N. Amer. Pl. 5. 1900.

Ditaxis lanceolata Pax & K. Hoffmn. Pflanzenreich 4^{147.v1}: 71. 1912

Low pubescent shrubs, often dioecious rather than monoecious, 2.5-4 dm. high, stems arising from woody base, erect, simple or, if branching, the branches sharply ascending. Leaves short-petiolate, linear-lanceolate, in vigorous plants broadly lanceolate, entire, 1-2.5 cm. long, densely pubescent with long setose appressed hairs; inflorescence sessile; staminate flowers 3-4; sepals about 2.5 mm. long, surpassed by the short-clawed ovate-lanceolate petals; gland thickened, minute, lanceolate; sepals of pistillate flowers lanceolate, 3-4 mm. long, not white-margined or very narrowly so; pistillate petals clawed, ovate-lanceolate, nearly equaling the sepals, adnate with the thin, minute, mostly broadly triangular glands to disk at base of ovary; ovary 3-celled, densely hairy; styles short, adnate about half their length, the free portion deeply bifid; stigmas broadly dilated; seeds grayish or brownish, faveolate, the depressions marked with minute radiating ridges.

Rocky slopes, Lower Sonoran Zone; Colorado Desert, California, east to western Arizona and south to Lower California and Sonora. Type locality: Magdalena Bay, Lower California. March-Oct.

3. *Ditaxis serrata* (Torr.) Heller. Yuma *Ditaxis*. Fig. 3022.

Aphora serrata Torr. Bot. Mex. Bound. 197. 1858.

Ditaxis serrata Heller, Cat. N. Amer. Pl. 5. 1900.

Ditaxis odontophylla Rose & Standley, Contr. U.S. Nat. Herb. 16: 12. 1912.

Annuals or short-lived perennials, pubescent, 1–2 dm. high, branching from the base, the stems decumbent or prostrate. Leaves 1–3 cm. long, obovate to oblong, obtuse, typically serrate at the apex, densely covered with slender appressed or crinkled hairs mixed with long appressed setose hairs; racemes congested in the leaf-axils; staminate flowers 3 mm. long, staminate petals longer than the sepals or equaling them; pistillate sepals 3.5–5 mm. long, pubescent, attenuate, the white margins inconspicuous; pistillate petals hairy on the back with pilose and long setose hairs, clawed, the blade deltoid, one-half to more than one-half as long as the calyx; pistillate gland thin, 0.5 mm. long or less; seeds brownish or grayish, globose-ovoid, nearly smooth, marked with low corrugate reticulations.

Desert slopes, Lower Sonoran Zone; Colorado Desert, California, south to Lower California and east to southwestern Arizona and Sonora. Type locality: "Fort Yuma, California." April–Sept.

4. *Ditaxis neomexicana* (Muell. Arg.) Heller. Common *Ditaxis*. Fig. 3023.

Argythamnia neomexicana Muell. Arg. Linnaea 34: 147. 1865.

Ditaxis neomexicana Heller, Cat. N. Amer. Pl. 5. 1898.

Annuals or short-lived many-stemmed perennials, 1–3.5 dm. high, the branches when present spreading, herbage sometimes purplish. Leaves 1–2.5 cm. long, narrowly or broadly oblanceolate, mostly acute, more or less strigose with setose hairs, the margins entire or serrulate, veins prominent on the lower surface at base of leaf; inflorescence few-flowered, congested in the leaf-axils; staminate flowers 1.5–2 mm. long, the petals longer than the sepals; pistillate sepals 3.5–5 mm. long, narrowly lanceolate, conspicuously white-margined, occasionally with few glandular teeth present on the margins, the external gland-like fold of the white margin at the base of the sepal more or less conspicuous; pistillate petals 1.5–2.5 mm. long, one-half to more than one-half the length of the sepals, more or less hairy on the back, setose hairs occasionally present; seeds ovoid, brownish, foveolate, depressions marked with minute radiating ridges.

Desert slopes, Lower Sonoran Zone; Mojave Desert, California, south to Lower California, east to western Texas and south to Sonora. Type locality: New Mexico. March–Dec.

The plants from western Arizona and from California differ somewhat from typical material but are extremely variable as to density of pubescence and relative lengths of pistillate sepals and petals.

5. *Ditaxis californica* (Brandg.) Pax & K. Hoffm. California *Ditaxis*. Fig. 3024.

Argythamnia californica Brandg. Zoe 5: 230. 1906.

Ditaxis californica Pax & K. Hoffm. Pflanzenreich 4^{147.v.1}: 70. 1912.

Annuals 1.5–3 dm. high with divergent branches, the young growth purplish, glabrous or nearly so. Leaves 2.5–4.5 cm. long, oblanceolate, serrulate, typically glabrous; inflorescence congested; staminate flowers 2.5 mm. long, the petals equaling or exceeding the sepals; pistillate sepals linear-attenuate, 3.5–4.5 mm. long, white margins with a few marginal glands, the external gland-like fold of the white margin at the base of the sepal conspicuous; pistillate petals clawed, broadly deltoid; ovary glabrous or nearly so; seeds brown, foveolate, the depressions more or less marked with minute radiating ridges.

Desert slopes, Lower Sonoran Zone; rare, in the Coachella and Eagle Mountains, northern Colorado Desert, California. Type locality: near Coachella, California. April–May.

4. *CRÒTON* L. Sp. Pl. 1004. 1753.

Stellate-pubescent, more or less glandular and strong-scented monoecious or dioecious herbs or shrubs, with mostly alternate, entire, toothed or lobed leaves, and monoecious or dioecious flowers in terminal or axillary clusters. Staminate flowers uppermost; calyx usually 5-parted; petals usually present, small or rudimentary, alternating with the glands; stamens 5 or more, inflexed. Pistillate flowers clustered below the staminate; calyx 5–10-parted; petals usually wanting; ovary 3-celled; ovules 1 in each cell; styles once, twice or many times 2-cleft. Capsule splitting into usually 2-valved carpels; seeds smooth or minutely pitted. [Greek name of the Castor-oil plant.]

About 600 species of tropical and subtropical regions of the world. Type species, *Croton Tiglium* L.

1. *Croton californicus* Muell. Arg. California *Croton*. Fig. 3025.

Croton californicus Muell. Arg. in A. DC. Prod. 12²: 691. 1866.

Croton californicus var. *major* S. Wats. Bot. Calif. 2: 69. 1880.

Erect or spreading suffrutescent dioecious perennials, 2–10 dm. high, with a stellate scurfy pubescence throughout. Leaf-blades entire, 1.5–5 cm. long, oblong, petioles slender, 1–3 cm. long, pubescence more sparse above; pistillate inflorescence few-flowered, short-racemose; pistillate flowers 2 mm. long or more, pedicels 2–4 mm. long; staminate inflorescence many-flowered, the raceme elongating in age, staminate flowers about 2 mm. long on slender pedicels 3–4 mm. long,



3017. *Tetracoccus ilicifolius*
 3018. *Tetracoccus Hallii*
 3019. *Eremocarpus setigerus*

3020. *Ditaxis adenophora*
 3021. *Ditaxis lanceolata*
 3022. *Ditaxis serrata*

3023. *Ditaxis neomexicana*
 3024. *Ditaxis californica*
 3025. *Croton californicus*

the flowers deciduous; stamens 12-15; styles 3, palmately 2-5-cleft or twice bicleft; capsule 5-6 mm. long.

Sandy hills and valleys of coastal California, Upper and Lower Sonoran Zones; Contra Costa County, California, to Lower California. Type locality: San Francisco, California. A variable species breaking up into ill-defined forms. April-Aug.

Croton californicus var. *ténus* (S. Wats.) Ferg. Rep. Mo. Bot. Gard. 12: 64. pl. 27. fig. 1. 1901. Plant with more slender stems, and narrower, oblong to lanceolate pale leaves. Santa Barbara to Lower California and east to Arizona. Type locality: southern California.

Croton californicus var. *mohavensis* Ferg. op. cit. 65. 1901. Plant with smaller leaves 0.5-2 mm. long. Kern County east through the Mojave and Colorado Deserts to Arizona. Type locality: "Soda Lake, Ft. Mohave."

Croton Wigginsii L. C. Wheeler, Contr. Gray Herb. No. 124: 37. 1939. (*Croton arenicola* Rose & Standl. Contr. U.S. Nat. Herb. 16: 12. 1912. Not J. K. Small.) Low shrub, capsule 10-11 mm. long, seeds 7-8 mm. long. A related species found in southeastern Imperial County, California, and adjacent Sonora. Type locality: Adair Bay, Sonora.

5. *BERNÁRDIA* Houst. ex P. Br. Nat. Hist. Jamaica 361. 1756.

Monoecious or dioecious shrubs with alternate stipulate leaves. Staminate inflorescence in axillary racemes, the flowers usually bracteate; stamens distinct on a receptacle, anther-cells distinct. Pistillate flowers few, clustered on the ends of branches or axillary. Sepals 4-6. Ovary 3-celled, ovules solitary in each cell, disk or glands present; stigmas short, entire or lacinate. Capsule dehiscent. Seeds ecarunculate. [Name in honor of P. F. Bernard, French botanist.]

About 40 species of American tropical and subtropical regions. Type species: *Bernardia carpinifolia* Griseb.

1. *Bernardia incana* C. V. Morton. Western *Bernardia*. Fig. 3026.

Bernardia incana C. V. Morton, Journ. Wash. Acad. 29: 376. 1939.

Dioecious much-branched shrub, 1-3 m. high, with glabrous branches and tomentulose branchlets. Leaves thick, crenate or crenate-dentate, 1-2.5 cm. long, short petiolate, densely short stellate-pubescent beneath, less dense above; stipules thick, lanceolate; staminate inflorescence slender, axillary, bracteate, 1-1.5 cm. long, the flowers in fascicles along the rachis; staminate flowers 1 mm. long or less, the sepals 3, stellate-pubescent, pedicels slender, sometimes glabrous; stamens 5-8; pistillate flowers sessile, 1-2 mm. long, bracteate, terminal, solitary or clustered, stellate-pubescent throughout; sepals 5; ovary 3-celled, 3-lobed; stigmas short, thick, lacinate; capsule 7-9 mm. long, occasionally with but 1 or 2 cells developing; seeds about 5 mm. long, carinate.

Rocky desert canyons, Lower Sonoran Zone; San Bernardino County, California, south to Lower California and east to Arizona. Type locality: Sierra Tucson, Arizona. May-June.

Mercurialis annua L. Sp. Pl. 1035. 1753. Glabrous annual with opposite serrate leaves and monoecious flowers, the staminate in interrupted spikes, the pistillate axillary below the staminate; capsule 2-celled, 1-seeded. Growing spontaneously in western part of San Mateo County, California.

6. *ACALÝPHA* L. Sp. Pl. 1003. 1753.

Monoecious, rarely dioecious herbs or shrubs with alternate stipulate leaves. Flowers in spikes or spike-like racemes. Staminate flowers bracteate, in glomerules on slender spikes. Sepals 4, valvate. Stamens 8 or more, anther-cells distinct. Pistillate flowers in spikes or at base of staminate spikes, bracteate. Sepals 3-5. Ovary 3-celled, with 1 ovule in each cell. Styles free or somewhat united at the base, usually laciniately divided. Capsule 3-celled, dehiscent. Seeds subglobose. [Name Greek, meaning nettle.]

About 400 species in the tropical and subtropical regions of the world. Type species, *Acalypha virginica* L.

1. *Acalypha californica* Benth. California *Acalypha*. Fig. 3027.

Acalypha californica Benth. Bot. Sulph. 51. 184.

Low monoecious, apetalous shrub, 1.5-4 dm. high with slender branches. Leaves petiolate, ovate or deltoid with crenate margins, greenish, sparsely or densely pubescent with simple hairs, glandular; staminate inflorescence spicate, 1.5-2.5 cm. long, the flowers in clusters along axis subtended by toothed bracts; staminate flowers 0.5 mm. or less in diameter; staminate sepals 4; stamens 3 on a raised receptacle, anther-cells slender, distinct; pistillate flowers in short spike or solitary at base of staminate inflorescence; flowers surpassed by cup-shaped crenate bracts with tack-shaped marginal glands; sepals fliform; ovary pubescent, 1 mm. long; styles 3, usually reddish, fliform, much-branched, 3 mm. long; capsule pubescent, 2-3 mm. long.

Dry canyons and washes, Lower Sonoran Zone; San Diego County, California, south to Lower California and east to Sonora. Type locality: Magdalena Bay, Lower California. Feb.-Oct.

7. *TRÀGIA* L. Sp. Pl. 980. 1753.

Perennial monoecious, rarely dioecious herbs or vines with alternate stipulate leaves, usually with stinging hairs. Inflorescence racemose, bracteolate, staminate flowers above, pistillate below. Flowers in ours with jointed pedicels, apetalous. Staminate flowers with

3-6-parted calyx; stamens 1 to many. Pistillate flowers 3-6-parted or rarely 8-parted; calyx-segments in ours entire. Ovary 3-celled, 1 ovule in each cell; styles 3. Capsule 3-lobed, splitting into 3 bivalved carpels. [From Tragus, Latin name of Hieronymus Bock, German herbalist.]

About 125 species, natives of the tropical regions of the eastern hemisphere and tropical and temperate regions of the western hemisphere. Type species, *Tragia volubilis* L.

1. *Tragia stylaris* Muell. Arg. Desert *Tragia*. Fig. 3028.

Tragia stylaris Muell. Arg. *Linnaea* 34: 180. 1865.

Slender, erect, much-branched herb arising from a woody caudex. Leaves with short petioles, lanceolate to triangular-lanceolate, serrate, sparsely hispid with stinging hairs; inflorescence 5-15 mm. long, pistillate flower at base of raceme or absent; staminate flowers 3-7; staminate bracts about 1 mm. long, equaling or shorter than first joint of pedicel; pistillate sepals 1 mm. long; ovary densely hairy, stigmas divided to base, about 3 mm. long, somewhat roughened; staminate sepals 2.5 mm. long, broadly lanceolate, recurved in anthesis; stamens 4-5, filaments clavate, shorter than the sepals; capsules 3-lobed, pubescent, 5-6 mm. broad; seeds globose, brown, often mottled.

Dry desert slopes, Upper Sonoran Zone; southwestern Nevada south through eastern California and east to Texas. Type locality: New Mexico. May-July.

8. *STILLÍNGIA* L. Mant. 19. 1767.

Glabrous herbs or shrubs with alternate or rarely opposite, entire or toothed leaves, often with 2 glands at the base. Flowers apetalous, monoecious, in terminal or axillary bracteolate spikes, the bractlets 2-glandular. Staminate flowers several together or solitary in the axils of the bractlets; calyx entire or lobate; stamens 2-3, exserted. Pistillate flowers solitary in the axils of bracts; calyx 3-parted or none. Ovary 1 in each cell, styles 3-parted usually to the base. Capsule 2-3-lobed, separating into 2-3 bivalved carpels, in ours breaking away from the persistent 3-lobed gynophore. Seeds ovoid or subglobose, carunculate or ecarunculate. [Name in honor of Benjamin Stillingfleet, English botanist.]

Species about 15, natives of North and South America, Madagascar and the islands of the Pacific. Type species, *Stillingia sylvatica* L.

Leaves ovate, spinulose-serrate throughout; inflorescence much shorter than the leaves.

1. *S. spinulosa*.

Leaves linear, entire or with occasional spinulose teeth; inflorescence as long as or much surpassing the leaves.

Spikes of the inflorescence dense, staminate portion in anthesis 5-6.5 mm. broad; leaves crowded.

2. *S. paucidentata*.

Spikes of the inflorescence open, lax, staminate portion in anthesis 3-4 mm. broad; leaves not crowded.

3. *S. linearifolia*.

1. *Stillingia spinulosa* Torr. Annual *Stillingia*. Fig. 3029.

Stillingia spinulosa Torr. in Emory, Notes Mil. Rec. 152. 1848.

Sapium annuum Torr. Bot. Mex. Bound. 201. 1858

Stillingia annua Muell. Arg. in A. DC. Prod. 152: 1160. 1866.

Tufted, glabrous, leafy winter annual, branching from the base, 5-35 cm. high. Leaves ovate, attenuate at the base, decurrent on the petiole, margin spinulose-toothed, prominently 3-veined beneath, 1.5-5 cm. long; inflorescence of many short bracteate spikes 0.5-2 cm. long, mostly shorter than the leaves, each bract subtending but 1 flower; staminate calyx shallowly and irregularly lobed, 1.3 mm. long, the subtending bract acuminate, dentate, scarcely as long as the narrow stalked glands; stamens 2, 2 mm. long, anthers divergent; pistillate flowers 1-2 at the base of the spike; pistillate perianth none, bracts and glands like those of the staminate flowers; capsule 4-5 mm. high, central column very fragile, usually breaking off with the dehiscence of the capsule; seeds 3 mm. long, mostly ecarunculate.

Open sandy deserts and dry washes, Lower Sonoran Zone; Death Valley region of California and adjacent Nevada south to Imperial County, California, and east to southwestern Arizona. Type locality: banks of the Gila, Arizona. March-June.

2. *Stillingia paucidentata* S. Wats. Mojave *Stillingia*. Fig. 3030.

Stillingia paucidentata S. Wats. Proc. Amer. Acad. 14: 298. 1879.

Glabrous plant from a perennial root with stems simple or much-branched above, 2-3.5 dm. tall. Leaves many, crowded on the upper part of the stem, linear, attenuate at the apex, with occasional spinulose teeth on the margin, 3-8 cm. long; inflorescence of many bracteate spikes, these at flowering as long as or longer than the subtending leaves; staminate flowers many, crowded; calyx irregularly 2-lobed, 1.5 mm. long, the subtending bract acuminate, shorter than the calyx; the 2 glands large, nearly sessile, rarely a third gland present; stamens 2, 3-3.2 mm. long; pistillate flowers 3-9, crowded at the base of the spike; pistillate perianth none, bracts and glands as in staminate flowers; capsule 3.5-4 mm. high, the column of the gynophore usually persistent after dehiscence.

Open desert slopes, Lower Sonoran Zone; southern Inyo County south to Riverside and Los Angeles Counties, California, and east to the Colorado River, Arizona. Type locality: "Colorado Valley near the mouth of the Williams River," Arizona. March-June.

3. *Stillingia linearifolia* S. Wats. Linear-leaved *Stillingia*. Fig. 3031.*Stillingia linearifolia* S. Wats. Proc. Amer. Acad. 14: 297. 1879.*Stillingia agymnogyna* Pax & K. Hoffm. Pflanzenreich 447.v: 196. 1912.

Glabrous freely branching plants, several-stemmed from a woody base. Leaves subsessile, linear, entire, 1.5–4 cm. long; inflorescence of several bracteate spikes, 4–7 cm. long; staminate flowers many, often reddish; calyx 2-lobed, the tube slender, about 0.5 mm. long, much shorter than the 2 divergent stamens, the subtending bracts triangular, mostly shorter than the broad stalked glands; pistillate flowers 4–7, scattered, 5–9 mm. long, not crowded on the rachis, the perianth none, bracts and glands as those in the staminate flowers; capsule 2.5 mm. high, 3.5 mm. broad, the column of the gynophore more or less persistent; seeds 3 mm. long.

Desert and interior foothills, Lower Sonoran Zone; San Bernardino County, California, south to central Lower California and western Sonora. Type locality: San Diego County, California. March–May.

9. *RÍCINUS* L. Sp. Pl. 1007. 1753.

A tall monoecious herb, often becoming a small tree. Leaves alternate, large, peltate, palmately lobed and toothed. Flowers numerous, small, apetalous, greenish, in terminal racemes, the pistillate above the staminate. Staminate flowers with a 3–5-parted calyx and numerous crowded stamens; filaments branched. Pistillate flowers with a caducous calyx. Ovary 3-celled, 3-ovuled; styles red, 3, united at the base, 2-cleft. Capsule subglobose or oval, separating into three 2-valved carpels. Seeds ovoid or oblong, mottled. [Latin name of the plant.]

A monotypic genus native to Africa and Asia. Type species, *Ricinus communis* L.

1. *Ricinus communis* L. Castor Bean. Fig. 3032.*Ricinus communis* L. Sp. Pl. 1007. 1753.

Tall annual herb or in frostless regions becoming a shrub or small tree, 1–4 m. high, glabrous throughout, reddish-tinged. Leaves 1.5–3.5 dm. broad; inflorescence racemose; capsule 10–15 mm. high, smooth or spiny; seeds about 10 mm. long, conspicuously carunculate, mottled.

Introduced plant established in southern California and occasional in protected areas in central California. Type locality: Eurasia. May–Sept.

10. *EUPHÓRBIA** L. Gen. Pl. ed. 5. 208. 1754.

Herbs, shrubs, or trees with milky juice. Leaves simple, alternate, opposite, whorled, or absent. Stipules often present. Flowers monoecious (or dioecious in some extralimital species), several to numerous, staminate and 1 central pistillate surrounded by an involucre forming a cyathium. Involucre gamophyllous, usually with 5 lobes alternating with 5 naked or variously margined glands, one or more of the glands often wanting. Staminate flowers naked, monandrous, consisting of a solitary stamen jointed to the staminate pedicel which is usually subtended by a bracteole. Pistillate flower ecalyculate or with a minute calyx, apetalous, borne centrally in the cyathium on a pedicel, soon exerted from the involucre and usually reflexed. Ovary 3-celled. Styles 3, bifid or entire. Capsule 3-celled, usually dehiscent. Seeds carunculate or ecarunculate. [Name in honor of Euphorbus, physician to Juba II, King of Mauretania.]

About 1,600 species, most abundant in the warmer temperate zone. Type species, *Euphorbia antiquorum* L.

Leaves alternate at least below the inflorescence (except decussate in *E. Lathyris*), equilateral; stipules wanting, or if present, gland-like; seeds carunculate, or if ecarunculate, plant a shrub.

Shrub; glands 5, with petaloid appendages; seeds ecarunculate.

II. AGALOMA.

Herbs; glands 3–5, without petaloid appendages; seeds carunculate.

Styles entire; glands cupped and concealed by inflexed lacerate margin; stipules gland-like; stems not umbellately branched.

I. POINSETTIA.

Styles bifid; glands convex, not concealed; stipules absent; stems umbellately branched above.

III. ESULA.

Leaves all opposite, not decussate, usually inequilateral; stipules present, not gland-like; seeds ecarunculate; herbs.

IV. CHAMAESYCE.

Our only species. I. POINSETTIA.

1. *E. eriantha*.

Our only species. II. AGALOMA.

2. *E. misera*.

III. ESULA.

Stem-leaves decussate; capsule 7–15 mm. long, spongy when fresh.

3. *E. Lathyris*.

Stem-leaves alternate; capsule not more than 5 mm. long, never spongy.

Stem-leaves serrate or serrulate; glands entire and rounded; seeds obviously reticulate.

Umbel-rays mostly 5, trichotomous below; capsules smooth; seeds ovoid, esculate-reticulate.

4. *E. Helioscopia*.

Umbel-rays mostly 3, dichotomous throughout; capsules verrucose; seeds lenticular-ovoid, superficially reticulate.

5. *E. spathulata*.

* Text contributed by Louis Cutter Wheeler.

- Stem-leaves entire (or crenulate); glands horned (except lacerate or crenate in *E. incisa*); seeds not macroscopically reticulate though often mottled or rugulose.
- Umbel-rays 3-5; stem-leaves not linear, 1-2 cm. long; without sterile leafy branches.
- Carpels bicarinate on back; seeds with longitudinal grooves and rows of pits; staminate pedicels 1-1.5 mm. long; annual. 6. *E. Peplus*.
- Carpels not carinate; seeds without regular pits or grooves; staminate pedicels 2 mm. or more long; perennial except *E. crenulata*.
- Uppermost floral leaves connate; horns longer than gland; annual or biennial. 7. *E. crenulata*.
- Floral leaves all distinct; horns shorter than gland; perennial.
- Stem-leaves ovate-elliptical to broadly oblanceolate, epidermis not papillate; stems mostly slender (about 1.5 mm. thick), mostly numerous and sinuous; glands irregularly toothed all along the margin, without horns exceeding the teeth. 8. *E. incisa*.
- Stem-leaves mostly oblong to suborbicular, epidermis usually papillate; stems stouter, few, mostly straight; glands with short horns, the margin between crenulate. 9. *E. Palmeri*.
- Umbel-rays 7-20; stem-leaves narrowly linear, or, if broader, 3-6 cm. long; often with sterile leafy branches.
- Umbel-rays 7-12; stem-leaves 3-6 cm. long; seeds 2.5 mm. long. 10. *E. Esula*.
- Umbel-rays 15-20; stem-leaves 1-2 cm. long; seeds 2 mm. long. 11. *E. Cyprissias*.

IV. CHAMAESYCE.

- Ovary, capsule, and usually the herbage, glabrous; leaves often serrulate.
- Stipules united into a white glabrous membranous scale. 16. *E. albomarginata*.
- Stipules distinct or at least not forming a membranous scale.
- Styles entire, about as long as the capsule; appendages and involucre lobes deeply cut. 23. *E. Hooveri*.
- Styles bifid, shorter than the capsule; appendages (when present) and involucre lobes not notably cut.
- Glands circular or radially elongated, without appendages, herbage glabrous; leaves entire.
- Capsule 2-3 mm. long; leaves often over 7 mm. long.
- Seeds virtually flat on the face; capsule about 3 mm. long, longer than broad. 12. *E. platysperma*.
- Seeds ovoid; capsule 2-2.3 mm. long, broader than long. 13. *E. ocellata*.
- Capsule 1.2-1.7 mm. long; leaves 2-7 mm. long.
- Perennial; staminate flowers 40-50. 17. *E. Parishii*.
- Annual; staminate flowers 2-5. 19. *E. micromera*.
- Glands transversely elongated, appendages present; leaves sometimes serrulate.
- Seeds with regular definite transverse ridges, these usually passing through the angles.
- Seeds radially oblong-ovate to oblong; capsule widest at the middle; at least the stems often pubescent. 20. *E. Abramsiana*.
- Seeds radially ovate; capsule widest below the middle; herbage glabrous. 21. *E. glyptosperma*.
- Seeds smooth to faintly or even strongly wrinkled but never with regular transverse ridges.
- Capsule less than 2 mm. long.
- Leaves usually serrulate; hairs, if present, weak and curly; annual. 22. *E. serpyllifolia*.
- Leaves always entire; perennial though blooming the first year; hairs, if present, short and straight. 18. *E. polycarpa*.
- Capsule at least 2 mm. long.
- Leaves entire; herbage glabrous.
- Leaves linear, equilateral; annual. 14. *E. Parryi*.
- Leaves broad, markedly inequilateral; perennial. 15. *E. Fendleri*.
- Leaves serrate; herbage with some hairs, especially on the young stems. 24. *E. maculata*.
- Ovary, capsule, and herbage hairy; leaves entire except *E. serpyllifolia* var. *hirtula* and *E. supina*.
- Involucres urceolate (strongly contracted above).
- Appendages entire or crenate; hairs mostly clavate; perennial. 25. *E. arizonica*.
- Appendages deeply parted into a few attenuate segments; hairs tapering; annual. 26. *E. scitloba*.
- Involucres campanulate to obconical.
- Herbage with short, straight, spreading hairs.
- Capsule 2-2.3 mm. long, broader than long; staminate flowers 40-60. 13a. *E. ocellata* *Rattanii*.
- Capsule 1.1-1.4 mm. long, no broader than long; staminate flowers 2-32.
- Plant perennial but blooming the first year; appendages usually evident, glands transversely oblong; staminate flowers 15-32. 18a. *E. polycarpa* *hirtella*.
- Plant annual; appendages absent or rudimentary; glands usually circular; staminate flowers 2-5. 19. *E. micromera*.
- Herbage with curly, matted, or appressed hairs.
- Seeds scarcely angled, slenderly ovoid, encircled by 4-5 rounded ridges. 27. *E. pediculifera*.
- Seeds quadrangular, variously smooth to slightly but irregularly wrinkled.
- Leaves entire; plants perennial.
- Appendages glabrous. 28. *E. melanadenia*.
- Appendages with short spreading hairs beneath and on the margins. 29. *E. vallis-mortae*.
- Leaves serrulate; plants annual.
- Capsule sparsely villous; seeds irregularly wrinkled; staminate flowers 10-15. 22a. *E. serpyllifolia* *hirtula*.
- Capsule strigose; seeds with low rounded transverse ridges; staminate flowers 2-5. 30. *E. supina*.

1. *Euphorbia eriantha* Benth. Beetle Spurge. Fig. 3033.*Euphorbia eriantha* Benth. Bot. Sulph. 51. 1844.*Euphorbia exclusa* S. Wats. Proc. Amer. Acad. 18: 150. 1883.*Poinsettia eriantha* Rose & Standley, Contr. U.S. Nat. Herb. 16: 13. 1912.

Erect annual or biennial 20–50 cm. tall; stem glabrous, simple and stout below, with slender ascending branches above. Leaves glabrate, entire, linear, petiolate, 2–7 cm. long, the lower alternate, the long uppermost forming a whorl subtending and much surpassing the inflorescence; cyathia in terminal glomerules of 1 to several; involucre turbinate, 1.5–2 mm. in diameter, strigose; glands 3–5, sessile, sublateral, circular or radially oval, cupped, 1.4 mm. wide, margin bearing 5–7 pubescent digits inflexed to cover the gland; reduced glands totally absent; staminate flowers 23–36; capsule 5 mm. long, strigose, oblong, slightly roundly 3-lobed; seeds mottled gray-white, 4 mm. long, oblong, truncate, subquadrate, dorsiventrally compressed, carunculate.

Rocky canyons, Lower Sonoran Zone; Colorado Desert, California, east to Texas and Coahuila, south to Lower California and Sonora. Type locality: Magdalena Bay, Lower California. Jan.–May.

2. *Euphorbia misera* Benth. Cliff Spurge. Fig. 3034.*Euphorbia misera* Benth. Bot. Sulph. 51. 1844.*Trichosterigma miserum* Kl. & Gke. Abh. Akad. Berlin 1859: 42. 1860.

Shrub 0.5–1.5 m. tall; branches mostly thick, often tortuous, glabrate at maturity; branchlets short, thick, multinodate, scurfy, sparsely tomentulose. Leaves sparsely short-pubescent, petioles 2–5 mm. long, blades 5–15 mm. long, oval-oblong to obcordate-cuneate, entire; cyathia solitary, borne on the branchlets, long-peduncled; involucre open-campanulate, 3 mm. in diameter, pubescent; glands maroon, transversely oval to oblong, 1.5–2 mm. long; appendages usually conspicuous, white, glabrous, crenulate to bluntly toothed; staminate flowers 30–40; capsule glabrate, roundly 3-lobed, depressed-globose, 4–5 mm. long; seeds white, ecarunculate, ovoid, 3 mm. long, covered with shallow irregular concavities.

Occasional on seaward bluffs and desert mesas, Lower and Upper Sonoran Zones; coast of Orange and San Diego Counties, and northwestern Colorado Desert, California, south to Lower California. Type locality: San Diego, California. April–Sept.

3. *Euphorbia Lathyris* L. Caper Spurge. Fig. 3035.*Euphorbia Lathyris* L. Sp. Pl. 457. 1753.*Tithymalus Lathyris* Scop. Fl. Carn. ed. 2. 1: 333. 1772.*Euphorbia decussata* Salisb. Prod. Stirp. 389. 1796.*Galarhocus Lathyris* Haw. Syn. Pl. Succ. 143. 1812.

Glabrous, glaucous, erect annual or biennial, 0.5–1 m. tall; stems stout, simple; rays 4, 3 to several times dichotomous. Leaves entire, sessile; stem-leaves decussate, oblong-linear below to lanceolate with cordate base above, 5–15 cm. long; umbel-leaves similar to upper stem-leaves; floral leaves ovate-lanceolate, subcordate, to 9 cm. long; involucre glabrous, broadly campanulate, 2.5 mm. in diameter; glands crescentic, 2 mm. long, horns short, the broad tips deflexed; fifth gland absent; sinus V-shaped, slightly depressed; staminate flowers 15–40; capsule (fresh) spongy, glabrous, depressed-globose, roundly 3-lobed, to 1.5 cm. long; capsule (dry) wrinkled, 7–10 mm. long, bluntly 3-angled; seeds mottled, sordid brown, 5 mm. long, ovoid, slightly laterally compressed, apex depressed-truncate, base obtuse, testa with minute low rounded vermiculate ridges.

Waste places, mostly about shrubs, introduced from Europe, Upper Sonoran Zone; western Oregon, Siskiyou and Humboldt Counties, California, and near the coast from San Francisco Bay to Orange County, California. Type locality: Europe. May–Nov.

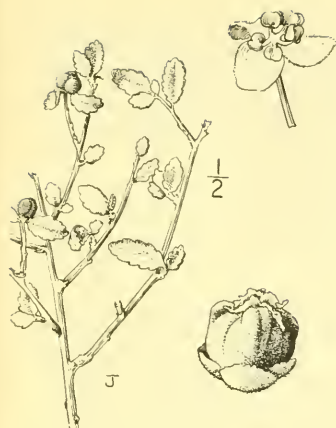
4. *Euphorbia Helioscopia* L. Wartweed or Wart Spurge. Fig. 3036.*Euphorbia Helioscopia* L. Sp. Pl. 459. 1753.*Tithymalus Helioscopia* Hill ex Scop. Fl. Carn. ed. 2. 1: 337. 1772.*Galarhocus Helioscopia* Haw. Syn. Pl. Succ. 152. 1812.

Erect annual, 12–30 cm. tall; stems 1–3, sparsely pilose, glabrate, often stout and fistulous; rays mostly 5, repeatedly trichotomous, then dichotomous, sparsely pilose, glabrate. Leaves glabrous, serrate; stem-leaves spatulate-obovate, 1–3 cm. long, lower petiolate; umbel-leaves similar, larger, sessile; floral leaves obovate-spatulate to rotund; involucre glabrous, 2 mm. in diameter, turbinate; glands transversely oval to oblong, entire, 0.6–0.7 mm. long; fifth gland short, subulate; sinus U-shaped, little depressed; staminate flowers 8–12; capsule glabrous, smooth, subglobose, basally flattened, roundly 3-lobed, 3 mm. long; seeds dark brown, 2.5 mm. long, ovoid, reticulate.

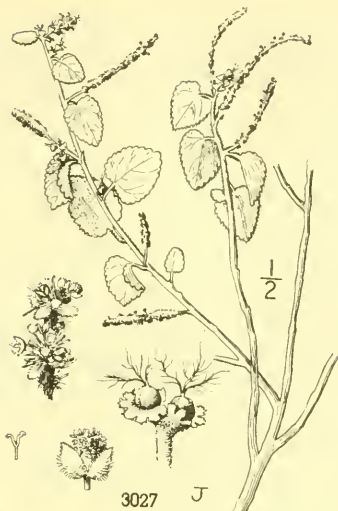
Introduced from Europe as a weed in fields and orchards, Upper Sonoran Zone; Whatcom County, Washington; Portland, Oregon; Humboldt and Los Angeles Counties, California; east to Quebec. Type locality: Europe. June–Sept.

5. *Euphorbia spathulata* Lam. Reticulate-seeded Spurge. Fig. 3037.*Euphorbia spathulata* Lam. Encycl. 2: 428. 1788.*Euphorbia dictyosperma* Fisch & Mey. Ind. Sem. Hort. Petrop. 2: 37. 1836.*Euphorbia arkansana* Engelm. & Gray, Bost. Journ. Nat. Hist. 5: 261. 1845.*Tithymalus dictyospermus* Heller, Muhlenbergia 1: 56. 1904.

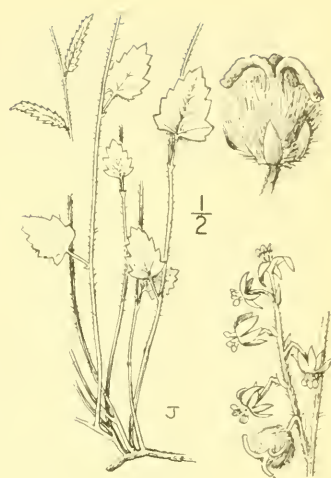
Glabrous erect annual, 13–35 cm. tall; stems 1- to several-branched below the umbel; rays 3, repeatedly dichotomous. Leaves serrulate; stem-leaves obovate-spatulate, 1–3 cm. long, the



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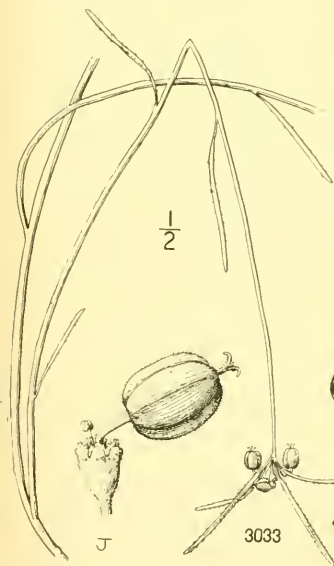
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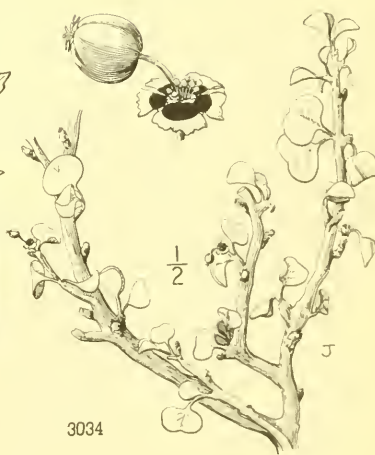
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3026. *Bernardia incana*
 3027. *Acalypha californica*
 3028. *Tragia stylaris*

3029. *Stillingia spinulosa*
 3030. *Stillingia paucidentata*
 3031. *Stillingia linearifolia*

3032. *Ricinus communis*
 3033. *Euphorbia eriantha*
 3034. *Euphorbia misera*

lower petioled; umbel-leaves oblong-spatulate, sessile, 1–2.5 cm. long; floral leaves ovate-elliptic, sessile; involucre glabrous, 1 mm. in diameter, broadly campanulate; glands transversely oblong, entire, 0.5–0.7 mm. long; fifth gland absent; sinus very broad, undepressed, ciliate; staminate flowers 5–8; capsule verrucose especially toward the apex, glabrous, 2.5 mm. long, depressed-globose, roundly 3-lobed; seeds brown, 2 mm. long, lenticular-ovoid, superficially reticulate.

Hill country, Upper Sonoran Zone; southern Washington, western Oregon and cismontane California, east to Iowa and Alabama; probably introduced in Argentina and Uruguay. Type locality: Montevideo, Uruguay. March–July.

6. *Euphorbia Péplus* L. Petty Spurge. Fig. 3038.

Euphorbia Péplus L. Sp. Pl. 456. 1753.

Tithymalus rotundifolius Lam. Fl. Franc. 3: 100. 1783.

Tithymalus Péplus Gaertner, Fruct. 2: 115. 1791.

Esula Péplus Haw. Syn. Pl. Succ. 158. 1812.

Glabrous annual, 10–45 cm. tall; stems 1 to several, erect or ascending, simple or branched below the umbel; rays 3, repeatedly dichotomous. Leaves entire, thin; stem-leaves 1–3.5 cm. long, rotund to obovate, petioled, umbel-leaves similar; floral leaves ovate, base cordate, sessile, distinct, to 2 cm. long; involucre glabrous, 1 mm. in diameter, campanulate; glands crescentic, body broad, 0.3 to 0.5 mm. long, with 2 slender spreading horns, otherwise entire; fifth gland short, deltoid, hairy; sinus U-shaped, depressed; staminate flowers 10–15; capsule glabrous, 2 mm. long, depressed-globose, sharply 3-angled, carpels bicarinate on back; seeds white, 1.3 mm. long, subhexagonal, oblong, ventral facets with 2 dark longitudinal grooves, lateral and dorsal facets each with a longitudinal row of 2–4 dark pits.

Mostly in well-watered sites about shrubbery, introduced from Europe, Upper Sonoran Zone; western Washington, western Oregon, and rare in the San Joaquin Valley, common near the coast in California. Type locality: Europe. Feb.–Aug.

7. *Euphorbia crenulata* Engelm. Chinese Caps. Fig. 3039.

Euphorbia leptocera Engelm. Pacif. R. Rep. 4: 135. 1856. (Nomen nudum.)

Euphorbia crenulata Engelm. Bot. Mex. Bound. 192. 1859.

Euphorbia crenulata var. *franciscana* Norton, No. Amer. Euphorbia sect. *Tithymalus* 38. 1899. Preprint from Rep. Mo. Bot. Gard. 11: 122. 1900.

Euphorbia Nortoniana A. Nels. Bot. Gaz. 47: 437. 1909.

Glabrous annual or biennial, 12–50 cm. tall; stems 1 to several, erect or declined at base, often branched below the umbel; rays mostly 5, sometimes 3 or 4, 2–3 times dichotomous. Leaves entire or occasionally irregularly crenulate; stem-leaves obovate to spatulate, petiolate to sessile, 1–3.5 cm. long; umbel-leaves rhombic-obovate to obovate, sessile, 1–3.5 cm. long; floral leaves deltoid-ovate to oval-reniform, sessile, more or less connate, to 2.5 cm. long; involucre turbinate-campanulate, 2 mm. in diameter, glabrous; glands crescentic, body thick, 1–2 mm. long, horns usually long, slender; fifth gland narrowly deltoid, moderately long; sinus U-shaped, slightly depressed; staminate flowers 11–18; capsule glabrous, 3.5 mm. long, oblong-cylindrical, roundly 3-lobed; seeds mottled, cinereous, 2.2–2.5 mm. long, oblong-ovoid, with low irregular vermiculate ridges.

In shady sites in the foothills, Upper Sonoran and Transition Zones; Oregon, south through cismontane California to Orange County, east to Colorado. Type locality: near Monterey, California. March–July.

8. *Euphorbia incisa* Engelm. Mojave Spurge. Fig. 3040.

Euphorbia incisa Engelm. in Ives, Rep. 4: 27. 1860.

Euphorbia schizoloba Engelm. Proc. Amer. Acad. 5: 173. 1861.

Tithymalus schizolobus Norton, Contr. U.S. Nat. Herb. 25: 343. 1925.

Glabrous, glaucous perennial; stems very numerous from the root crown; slender, erect or ascending, 20–40 cm. long, often branched below the umbel; rays mostly 5, sometimes 3–4, 2–3 times dichotomous. Leaves entire, thick; stem-leaves ovate-elliptic to broadly oblanceolate, 1–2 cm. long, short petiolate, mucronate; umbel-leaves long-oval to elliptic-ovate, sessile, 1–1.5 cm. long; floral leaves deltoid-oval to cordate, sessile, sometimes puberulent at base, to 1 cm. long; involucre campanulate, glabrous, 2.5 mm. in diameter; glands broadly transversely oblong to oblong-crescentic, 2–3 mm. long, short-horned or hornless, margin lacerate to crenate; staminate flowers 16–23, sparsely pubescent to glabrous; capsule glabrous, 4 mm. long, oblong-ovoid, roundly 3-lobed; seeds white to sordid, 3 mm. long, oblong-ovoid, with very low vermiculate ridges.

Arid slopes, and rarely in low washes, Lower and mostly Upper Sonoran Zones; desert ranges in Inyo and San Bernardino Counties, rare in the Colorado Desert, California, east to Nevada and Arizona. Type locality: Railroad Pass, Cerbat Mountains, Mohave County, Arizona. March–June.

9. *Euphorbia Palmeri* Engelm. Wood Spurge. Fig. 3041.

Euphorbia Palmeri Engelm. Bot. Calif. 2: 75. 1880.

Tithymalus Palmeri Abrams, Fl. Los Ang. 216. 1917.

Glabrous, glaucous perennial, 15–30 cm. tall; stems ascending to erect, numerous from the woody root crown, mostly simple below the umbel; rays mostly 5, sometimes 3 or 4, 1–3 times dichotomous. Leaves thick, entire; stem-leaves narrowly obovate to oblong-spatulate, 1–2 cm. long, sessile or shortly petiolate, grading downward into crowded early-deciduous scales on subterranean portion of stem; umbel-leaves broadly rhombic to rhombic-cordate, sessile, 1–1.8 mm. long; floral leaves oval-cordate to oval-spatulate, to 1 cm. long; involucre campanulate, glabrous, 2 mm. in diameter; glands 1.2–2 mm. long, broadly crescentic, very short horned,

margin crenulate; fifth gland short, densely long-hairy; staminate flowers 15-16; capsule smooth, 4.5-5 mm. long, broadly-oblong, truncate, cylindrical, roundly 3-lobed; seeds white or mottled with brown, 3 mm. long, cylindrical, oblong-ovoid, with low irregular vermiculate ridges.

Common on dry openly wooded mountain slopes, Transition and Canadian Zones; Mount Pinos, Ventura County, to Laguna Mountains, San Diego County, California, east to Arizona and Utah. Type locality: Talley's Ranch, Cuyamaca Mountains, San Diego County, California. May-Aug.

10. *Euphorbia Esula* L. Leafy Spurge. Fig. 3042.

Euphorbia Esula L. Sp. Pl. 461. 1753.

Tithymalus Esula Scop. Fl. Carn. ed. 2. 1: 338. 1772.

Euphorbia virgata Waldst. & Kit. Pl. Rar. Hung. 2: 176. t. 162. 1805. Not Desf. 1804.

Tithymalus virgatus Kl. & Gke. ex Garcke Fl. Deutschl. ed. 4. 292. 1858.

Perennial from a rootstock, glabrous; stems erect, few to several, 4-7 dm. tall, often with sterile densely leafy branches and numerous fertile branches below the umbel; rays 7-12, 2-7 cm. long, 2-3 times dichotomous. Stem-leaves 3-6 cm. long, oblong-linear to linear; umbel-leaves ovate-lanceolate to oblong-ovate, 1-2 cm. long; floral leaves yellowish green, reniform-cordate to deltoid-cordate, entire, sessile; involucre glabrous, campanulate to obconical, 1.5-2 mm. in diameter; glands 1.5-2 mm. long, crescentic, the horns often denticulate; fifth gland scarcely equaling the other glands, tomentose; sinus narrowly U-shaped, not depressed; staminate flowers 11-21; capsule rugulose, glabrous, depressed-globose, 3 mm. long, roundly 3-lobed; seeds brown or whitish, 2.5 mm. long, oblong-cylindrical, smooth.

A field-weed introduced from Europe; Kititas, Klickitat, and Whitman Counties, Washington, and Modoc and Siskiyou Counties, California. Type locality: Europe. April-Oct.



3035. *Euphorbia Lathyris*

3036. *Euphorbia Helioscopia*

3037. *Euphorbia spathulata*

3038. *Euphorbia Peplus*

3039. *Euphorbia crenulata*

3040. *Euphorbia incisa*

11. *Euphorbia Cyparissias* L. Cypress Spurge. Fig. 3043.

Euphorbia Cyparissias L. Sp. Pl. 461. 1753.

Tithymalus Cyparissias Scop. Fl. Carn. ed. 2. 1: 339. 1772.

Esula Cyparissias Haw. Syn. Pl. Succ. 155. 1812.

Galarhoeus Cyparissias Small ex Rydb. Fl. Prairies & Plains 520. 1932.

Glabrous erect perennial 10–30 cm. tall; stems several, with densely leafy sterile branches below the umbel; rays 15–20, slender, 1–5 cm. long, 1–3 times dichotomous. Subterranean leaves scale-like, grading upward into the linear, entire, aerial stem-leaves 1–2 cm. long; umbel-leaves oblong-lanceolate, broadly sessile, about 1 cm. long; floral leaves yellowish green, reniform-cordate, entire, sessile; involucre glabrous, 2 mm. in diameter, turbinate-campanulate; glands semi-crescentic, 1.2–1.5 mm. long with short divergent horns, otherwise entire; fifth gland short, tomentose; sinus U-shaped, little depressed; staminate flowers 5–18; capsule rugulose, glabrous, 3 mm. long, depressed-globose, roundly 3-lobed; seeds brown or whitish, 2 mm. long, broadly oblong-cylindrical, smooth.

A garden escape, introduced from Europe; roadsides and waste places, Pullman, Washington. Type locality: Europe. May–Sept.

12. *Euphorbia platysperma* Engelm. Flat-seeded Spurge. Fig. 3044.

Euphorbia platysperma Engelm. Bot. Calif. 2: 482. 1880.

Euphorbia cremica Jepson, Man. Fl. Pl. Calif. 600. 1925.

Annual with glabrous herbage; stems prostrate, 10–20 cm. long, slightly glutinous. Leaves 6–12 mm. long, oblong, often mucronulate, slightly inequilateral, entire; stipules mostly distinct, 2–3-divided; cyathia solitary, involucre glabrous, turbinate, 1.5–1.75 mm. in diameter, glands 1 mm. wide, mostly radially elongate, sometimes emarginate, facing obliquely outward, exappendiculate; fifth gland subulate, short, glabrous; sinus U-shaped, slightly depressed; staminate flowers mostly 50; capsule rotund-ovoid, slightly 3-lobed, glabrous, 4 mm. long; seeds white, 3 mm. long, oblong, back rounded, face with 2 smooth, flat, nearly approximate facets separated by the elevated raphe, apex with an inflexed mucro.

Rare, sandy desert, Lower Sonoran Zone; Colorado Desert, California, east to southwestern Arizona (?) or Sonora. Type locality: "Near the mouth of the Colorado River, Arizona." May.

13. *Euphorbia ocellata* Dur. & Hilg. Valley Spurge. Fig. 3045.

Euphorbia ocellata Dur. & Hilg. Journ. Acad. Phila. II. 3: 46. 1854.

Chamaesyce sulfurea Millsp. Field Mus. Bot. Ser. 2: 405. 1916.

Chamaesyce ocellata Millsp. op. cit. 410.

Annual with glabrous herbage; stems prostrate, to 20 cm. long. Leaves 5–12 mm. long, ovate-deltoid-falcate, inequilateral, margin revolute, entire; stipules mostly distinct, linear, entire or parted; cyathia solitary; involucre glabrous, turbinate to campanulate, 1.5–2 mm. in diameter; glands circular or slightly radially oval, 0.5–0.75 mm. in diameter, exappendiculate; fifth gland linear, long; staminate flowers 40–60; capsule deeply roundly 3-lobed, 2–2.3 mm. long, glabrous, depressed-globose, smooth; seeds white to brownish, ovoid, 1.3–1.5 mm. long, smooth to rugose.

Common on dry flats, Lower Sonoran Zone; Sacramento, San Joaquin and Salinas Valleys and near San Bernardino, California. Type locality: Poso Creek, Kern County, California. May–Sept.

Euphorbia ocellata var. *arenicola* (Parish) Jepson, Man. Fl. Pl. Calif. 600. 1925. (*E. arenicola* Parish, Erythra 7: 93. 1899.) Glabrous; leaves 8–17 mm. long, ovate-lanceolate, not at all or very slightly falcate, acuminate; glands exappendiculate, seeds always very smooth. Occasional on the sandy desert, Lower Sonoran Zone; eastern Mojave Desert, California, east to Utah and Arizona. Type locality: Camp Cady, Mojave Desert, San Bernardino County, California.

Euphorbia ocellata var. *Rattánii* (S. Wats.) L. C. Wheeler, Bull. S. Calif. Acad. 33: 107. 1934. (*E. Rattánii* S. Wats, Proc. Amer. Acad. 20: 372. 1885.) Habit as in the typical species but the plant pubescent; glands often with narrow white appendages. Rare in dry flood beds of creeks. Lower Sonoran Zone; lower Stony Creek drainage, Tehama and Glenn Counties, California. Type locality: Stony Creek, Glenn County, California.

14. *Euphorbia Parryi* Engelm. Drift Spurge. Fig. 3046.

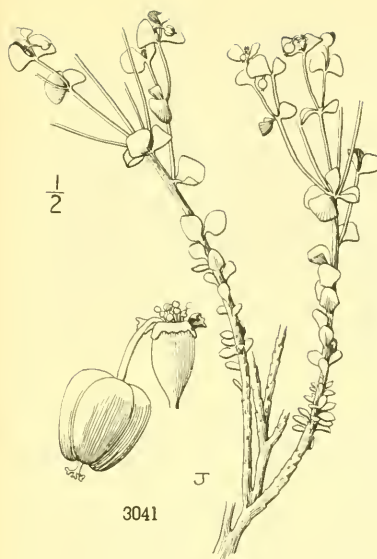
Euphorbia Parryi Engelm. Amer. Nat. 9: 350. 1875.

Euphorbia flagelliformis Engelm. in Brandg. Bull. Geol. Geogr. Surv. Terr. 2: 243. 1876.

Chamaesyce Parryi Rydb. Bull. Torrey Club 40: 53. 1913.

Annual, glabrous; stems spreading or erect, 5–32 cm. long. Leaves 5–22 mm. long, linear, entire, equilateral, shortly petiolate; stipules distinct, linear, entire or parted; cyathia long-peduncled; involucre campanulate, 1.5–1.75 mm. in diameter; glands 0.3–0.5 mm. long, transversely oval, cupped; fifth gland linear, equaling the other glands; sinus very broadly U-shaped, not depressed; appendages narrow, white, glabrous, entire, margining all except the inner side of the gland, ascending; staminate flowers 40–55; capsule deeply 3-lobed, oblate-spheroid, 2 mm. long; seeds mottled brown and white, 1.8 mm. long, narrowly ovate, ovoid-triangular.

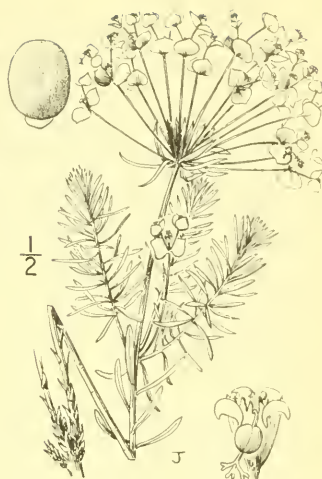
Sandy desert, Upper Sonoran Zone; eastern Mojave Desert, San Bernardino County, California, east to Colorado, south to Chihuahua. Type locality: St. George, Utah. May–Aug.



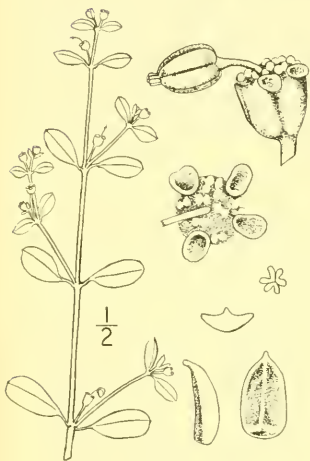
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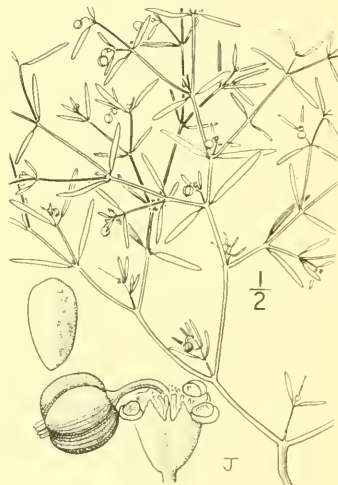
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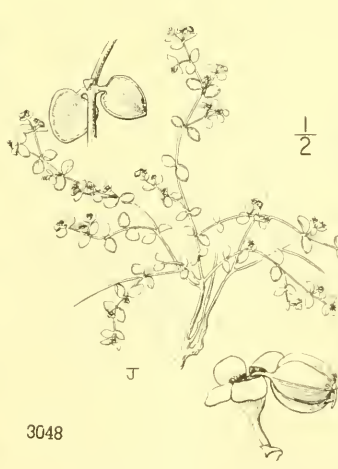
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3041. *Euphorbia Palmeri*
 3042. *Euphorbia Esula*
 3043. *Euphorbia Cyparissias*

3044. *Euphorbia platysperma*
 3045. *Euphorbia ocellata*
 3046. *Euphorbia Parryi*

3047. *Euphorbia Fendleri*
 3048. *Euphorbia albomarginata*
 3049. *Euphorbia Parishii*

15. *Euphorbia Fendleri* Torr. & Gray. Fendler's Spurge. Fig. 3047.

Euphorbia rupicola Scheele, *Linnaea* 22: 153. 1849. Not Boiss. 1838.

Euphorbia Fendleri Torr. & Gray, *Pacif. R. Rep.* ed. 2. 2: 175. 1857.

Euphorbia Fendleri var. *dissimilis* Payson, *Bot. Gaz.* 60: 379. 1915.

Chamaesyce Gooddingii Millsp. *Field Mus. Bot. Ser.* 2: 406. 1916.

Perennial, herbage glabrous; stems several to numerous, decumbent to erect, to 15 cm. long. Leaves 3–9 mm. long, ovate-cordate to ovate-elliptic, entire; stipules distinct, linear; cyathia solitary; involucre 1.25–1.75 mm. in diameter, campanulate to turbinate, glabrous; glands transversely oblong, reddish, 0.75–1.25 mm. long; fifth gland short, linear; sinus very broadly U-shaped, little depressed; appendages white, glabrous, as wide as the gland or narrower, obtusely crenate; staminate flowers 25–35; capsule 3-angled, globose, glabrous, 2.25–2.5 mm. long; seeds white, 2–2.25 mm. long, ovate, acute, quadrangular, angles prominent, facets smooth or slightly wrinkled.

Arid desert hills, Upper Sonoran Zone; Inyo and San Bernardino Counties, California, east to Nebraska and Oklahoma and south to Texas. Type locality: Santa Fé, New Mexico. April–Sept.

16. *Euphorbia albomarginata* Torr. & Gray. Rattlesnake Weed. Fig. 3048.

Euphorbia albomarginata Torr. & Gray, *Pacif. R. Rep.* ed. 2. 2: 174. 1857.

Chamaesyce albomarginata Small, *Fl. S.E.U.S.* 710, 1333. 1903.

Anisophyllum albomarginatum Kl. & Gke. *Abh. Akad. Berlin.* 1859: 53. 1860.

Perennial, herbage glabrous; stems prostrate, 10–30 cm. long. Leaves 3–6 mm. long, orbicular to oblong, entire; stipules united into a glabrous, white, membranous scale; cyathia solitary; involucre 1.5–2 mm. in diameter, open-campanulate to turbinate, glabrous; glands 0.5–1 mm. long, transversely oblong, mostly maroon; fifth gland linear; sinus U-shaped, little depressed; appendages mostly conspicuous, white, glabrous, entire to crenulate; staminate flowers 15–30; capsule sharply 3-angled, glabrous, ovoid, 1.7–2.3 mm. long; seeds white, 1.2–1.7 mm. long, narrowly oblong, quadrangular, angles rounded, facets smooth.

Common on dry hill slopes and plains, Lower and Upper Sonoran Zones; rare in southern San Joaquin Valley, but more abundant from Inyo County south to Mojave and Colorado Deserts, cismontane southern California east of Ventura County to Utah and Texas and south to Sonora. Type locality: Rio Pecos, Texas. March–Oct.

17. *Euphorbia Parishii* Greene. Parish's Spurge. Fig. 3049.

Euphorbia Parishii Greene, *Bull. Calif. Acad.* 2: 56. 1886.

Chamaesyce Parishii Millsp. in Parish, *Cat. Pl. Salton Sink* 6. 1913. Preprint from Carnegie Inst. Wash. Pub. No. 193: 110. 1914.

Euphorbia patellifera J. T. Howell, *Leaflets West. Bot.* 1: 53. 1933.

Perennial, herbage glabrous; stems mostly prostrate, 15–30 cm. long. Leaves 2–5 mm. long, mostly ovate, inequilateral, entire; stipules ciliate, mostly entire, dorsal distinct, broadly linear, ventral often united, linear; cyathia solitary; involucre glabrous, 1–1.2 mm. in diameter, turbinate; glands 0.5 mm. in diameter, circular, exappendiculate; fifth gland linear; sinus U-shaped, not depressed; staminate flowers 40–50; capsule sharply 3-angled, glabrous, depressed-globose, 1.7 mm. long; seeds white, 1.5 mm. long, long-ovate, sharply quadrangular, facets faintly wrinkled.

Dry desert washes and flats, Lower Sonoran Zone; deserts from Inyo County, south to San Diego County, California, and east to Nevada. Type locality: Warm Springs, Mojave Desert, San Bernardino County, California. March–June.

18. *Euphorbia polycarpa* Benth. Golondrina. Fig. 3050.

Euphorbia polycarpa Benth. *Bot. Sulph.* 50. 1844.

Chamaesyce polycarpa Millsp. in Parish, *Cat. Pl. Salton Sink* 6. 1913. Preprint from Carnegie Inst. Wash. Pub. No. 193: 110. 1914.

Perennial, herbage glabrous to pubescent; stems prostrate to erect. Leaves 3–6 mm. long, ovate to oblong, entire; stipules ciliate, dorsal distinct, linear, ventral united, narrowly deltoid; cyathia solitary; involucre 1–1.5 mm. in diameter, campanulate, glabrous to pubescent; glands maroon, transversely oblong, 0.5–0.7 mm. long; fifth gland absent; sinus U-shaped, not depressed; appendages to 3 times as wide as glands, white, glabrous, entire to crenate; staminate flowers 15–32; capsule sharply 3-angled, glabrous to pubescent, globose, 1.1–1.3 mm. long; seeds white to brownish, 1–1.2 mm. long, ovate, acutish, sharply quadrangular, facets smooth or slightly wrinkled.

Common on dry slopes and plains, Lower and Upper Sonoran Zones; deserts from Inyo County south to Imperial County and along the coast from Ventura County to San Diego, California, south to Lower California and Sonora. Type locality: Magdalena Bay, Lower California. Feb.–Dec.

Euphorbia polycarpa var. *hirtella* Boiss. in A. DC. *Prod.* 15²: 44. 1862. (*Chamaesyce tonsita* Millsp. *Field Mus. Bot. Ser.* 2: 412. 1916.) Herbage with short spreading hair and the appendages no wider than the glands. Common on desert hills and flats, Lower Sonoran Zone; southeastern Mojave Desert and Colorado Desert, California, east to Nevada, south to Lower California and Sonora. Type locality: "California," probably Colorado Desert, California.

19. *Euphorbia micróméra* Boiss. Desert Spurge. Fig. 3051.

Euphorbia micróméra Boiss. ex Engelm. in A. DC. Prod. 15²: 44. 1862.

Euphorbia pseudoserpyllifolia Millsp. Pittonia 2: 87. 1890.

Chamaesyce micróméra Wooton & Standley, Contr. U.S. Nat. Herb. 16: 144. 1913.

Euphorbia podagrifolia I. M. Johnston, Univ. Calif. Pub. Bot. 7: 440. 1922.

Annual, herbage glabrous to pubescent; stems prostrate, 12–25 cm. long. Leaves 3–7 mm. long, ovate to oblong, inequilateral, entire; stipules triangular, ciliate, dorsal distinct, ventral often united toward stem-tip; cyathia solitary; involucre 1 mm. in diameter, very short-campanulate; glands circular or slightly transversely oval, 0.1–0.15 mm. in diameter, exappendiculate or rarely with rudimentary appendages; fifth gland absent; sinus broadly V-shaped, little depressed, hairy; staminate flowers 2–5; capsule sharply 3-angled, globose, glabrous to glabrate, 1.2–1.4 mm. long; seeds brownish white, 1.1–1.3 mm. long, narrowly ovate, sharply quadrangular, facets smooth or faintly wrinkled.

Occasional on sandy desert flats, Lower Sonoran Zone; Inyo County south to Imperial County, California, east to Utah and Coahuila. Type locality: Rio San Pedro, Cochise County, Arizona. May–Nov.

20. *Euphorbia Abramsiana* L. C. Wheeler. Abrams' Spurge. Fig. 3052.

Chamaesyce saltonensis Millsp. in Parish, Cat. Pl. Salton Sink 6. 1913. Preprint from Carnegie Inst. Wash. Pub. No. 193: 110. 1914. (Nomen nudum.)

Euphorbia Abramsiana L. C. Wheeler, Bull. S. Calif. Acad. 33: 109. 1934.

Euphorbia pediculifera var. *Abramsiana* Ewan ex Jepson, Fl. Calif. 2: 427. 1936.

Annual, stems prostrate, slender, 8–25 cm. long, finely pubescent. Leaves shortly puberulent to glabrous, 2–12 mm. long, oblong to elliptic-oblong, entire or some serrulate; stipules distinct; cyathia solitary; involucre turbinate, 0.6–0.7 mm. in diameter; glands transversely elongate, 0.05–0.1 mm. long; fifth gland filiform; sinus V-shaped, not depressed; appendages mostly wider than the glands; staminate flowers 3–5; capsule glabrous, sharply 3-angled, globose, 1.3–1.7 mm. long; seeds white, 1–1.4 mm. long, oblong-ovate, sharply quadrangular, facets with 4–6 irregular transverse ridges slightly including the angles.

On the arid desert, Lower Sonoran Zone; Imperial County, California, south to Lower California, east to Arizona and northern Sinaloa. Type locality: Heber, Imperial County, California. June–Oct.

21. *Euphorbia glyptosperma* Engelm. Ridge-seeded Spurge. Fig. 3053.

Euphorbia glyptosperma Engelm. Bot. Mex. Bound. 187. 1859.

Euphorbia Greenei Millsp. Pittonia 2: 28. 1890.

Chamaesyce glyptosperma Small, Fl. S.E.U.S. 712, 1333. 1903.

Chamaesyce Greenei Rydb. Fl. Rocky Mts. 544, 1063. 1917.

Annual, herbage glabrous; stems prostrate, 6–30 cm. long. Leaves oblong to linear-oblong, often falcate, inequilateral, usually serrulate, 3–15 mm. long; stipules distinct, linear, entire or few-branched; cyathia solitary; involucre slenderly campanulate, glabrous, 0.6–0.9 mm. in diameter; glands transversely oblong, 0.15–0.4 mm. long; fifth gland of 1–3 long, linear segments; sinus narrowly U-shaped; appendages narrow, slightly wider than the glands, white, glabrous, subentire to crenate; staminate flowers mostly 4; capsule 1.4–1.7 mm. long, sharply 3-angled, glabrous, broadly ovoid; seeds white to brownish, 1.1–1.3 mm. long, ovate-truncate, sharply quadrangular, angles sharp, included by the several transverse ridges of the facets.

Occasional in the valleys, Lower and Upper Sonoran Zones; Washington to northern California, British Columbia east to New Brunswick, south to Texas. Type locality: Fort Kearney, Kearney County, Nebraska. June–Sept.

22. *Euphorbia serpyllifolia* Pers. Thyme-leaved Spurge. Fig. 3054.

Euphorbia serpyllifolia Pers. Syn. Pl. 2: 14. 1806.

Euphorbia occidentalis E. R. Drew, Bull. Torrey Club 16: 152. 1889.

Euphorbia serpyllifolia Pers. var. *rugulosa* Engelm. ex Millsp. Pittonia 2: 85. 1891.

Chamaesyce serpyllifolia Small, Fl. S.E.U.S. 712, 1333. 1903.

Euphorbia novomexicana L. C. Wheeler, Bull. S. Calif. Acad. 35: 129. 1936.

Annual, herbage glabrous; stems usually prostrate, 5–35 cm. long. Leaves ovate, oblong, obovate, narrowly oblong, linear-oblong, or oblong-lanceolate, inequilateral, 3–14 mm. long, usually serrulate toward the apex; stipules distinct, linear, entire or few-parted; cyathia solitary, involucre narrowly campanulate, glabrous, 0.8–1 mm. in diameter; glands transversely oblong, 0.2–0.5 mm. long; fifth gland long, linear, entire, hairy below; sinus U-shaped, slightly depressed; appendages narrow, white, glabrous, entire to bluntly toothed; staminate flowers 5–18; capsule 1.5–1.9 mm. long, sharply 3-angled, glabrous, broadly ovoid; seeds clay-white to brownish, 1–1.4 mm. long, oblong-ovate to narrowly ovate, ovoid-quadrangular to sharply quadrangular, angles rounded, facets often convex, smooth to rugulose.

Flats and open canyon bottoms, Lower and Upper Sonoran and Transition Zones; Washington, Oregon, and California, British Columbia east to Michigan, south to Texas. Type locality: "Hab.[itat] in Amer.[ica] calidiore." May–Nov.

Euphorbia serpyllifolia var. *hirtula* (Engelm.) L. C. Wheeler, Proc. Biol. Soc. Wash. 53: 11. 1940. (*E. hirtula* Engelm. Bot. Calif. 2: 74. 1880.) More or less villous; leaves always broad, 3–10 mm. long. Mostly in the pine belt, Transition Zone; central Sierra Nevada, Santa Lucia, San Bernardino, San Jacinto, and Cuyamaca Mountains, California, south to northern Lower California. Type locality: Talley's Ranch, Cuyamaca Mountains, San Diego County, California. June–Sept.

23. *Euphorbia Hoöveri* L. C. Wheeler. Hoover's Spurge. Fig. 3055.

Euphorbia Hooveri L. C. Wheeler, Proc. Biol. Soc. Wash. 53: 9. 1940.

Annual, glabrous; stems prostrate or decumbent, 6–20 cm. long. Leaves orbicular-cordate to reniform, epidermis papillate, margin with sharp white teeth; stipules united, white, deeply lacerate; cyathia solitary; involucre campanulate, glabrous, 1.7–2 mm. in diameter; glands transversely oval, 0.5 mm. long; fifth gland of mostly 2 filiform segments nearly equaling the lobes; sinus narrowly V-shaped; appendages parted into 3–5 white glabrous ligules about 1 mm. long; staminate flowers 30–35; capsules 1.6–1.9 mm. long, roundly 3-lobed, glabrous, spheroidal with flattened base; seeds white, 1.4–1.6 mm. long, ovoid-quadrangular, rotund-ovate, facets with low faint wrinkles.

Desiccate beds of subsaline rain-pools. Lower Sonoran Zone; Tehama and Tulare Counties, California. Type locality: Yettem, Tulare County, California. June–July.

24. *Euphorbia maculata* L. Large Spurge. Fig. 3056.

Euphorbia maculata L. Sp. Pl. 455. 1753.

Euphorbia nutans Lag. Gen. & Sp. Nov. 17. 1816.

Euphorbia Preslii Guss. Prodr. Sic. 539. 1827.

Chamaesyce maculata Small, Fl. S.E.U.S. 713, 1333. 1903.

Chamaesyce nutans Small, op. cit. 712, 1333.

Annual with stems usually erect, branching, sparsely tomentulose to glabrous, 20–45 cm. long. Leaves 7–30 mm. long, oblong to oblong-lanceolate, very sparsely villous, serrate; stipules more or less united, free portion subulate, with a few hairs; cyathia congested at the branch-tips; involucre 0.75–1 mm. in diameter, slenderly obconic, glabrous; glands long-stipitate, circular to transversely broadly elliptical, 0.1–0.2 mm. in diameter; fifth gland linear; sinus U-shaped, little depressed; appendages rudimentary to 0.5 mm. long, oval, white to reddish, glabrous, entire; staminate flowers 5–11; capsule glabrous, sharply 3-angled, depressed-globose, 2 mm. long; seeds dark gray, 1.1–1.3 mm. long, broadly oblong-ovate, angles rounded, facets wrinkled.

In the foothills and in waste places in the valleys, Lower and Upper Sonoran Zones; sparingly introduced in the Pacific States (Skamania County, Washington, Sierra Nevada foothills and Orange County, California); native of eastern United States and Mexico. Type locality: "America septentrionalis." April–Sept.

25. *Euphorbia arizonica* Engelm. Arizona Spurge. Fig. 3057.

Euphorbia arizonica Engelm. Bot. Mex. Bound. 186. 1859.

Euphorbia versicolor Greene, Bot. Gaz. 6: 184. 1881.

Euphorbia portulana S. Wats. Proc. Amer. Acad. 24: 75. 1889.

Euphorbia purisimana Millsp. Proc. Calif. Acad. II. 2: 225. 1889.

Perennials, stems erect or prostrate, 15–30 cm. long, slender, with fine spreading hairs. Leaves 2–10 mm. long, deltoid-ovate to ovate-oblong, entire, mostly finely pubescent; stipules minute; cyathia solitary; involucre slenderly urceolate, 0.8 mm. in diameter, sparsely pubescent; glands transversely oblong, 0.3–0.4 mm. long, red; appendages glabrous, entire to crenate, conspicuous, white but rubescent in age; fifth gland absent; sinus V-shaped, depressed halfway to base of involucre; staminate flowers 5–10, rarely 12; capsule pubescent, obtusely 3-angled, 1.5 mm. long, globose-ovoid; seeds quadrangular, 1.1–1.2 mm. long, narrowly ovate, facets with low ridges slightly including the angles, coat whitish.

Sandy desert flats, Lower Sonoran Zone; western borders of Coachella Valley and Colorado Desert, California, east to Texas, south to Sonora and Durango. Type locality: Arizona. March–Oct.

26. *Euphorbia setiloba* Engelm. Yuma Spurge. Fig. 3058.

Euphorbia setiloba Engelm. Pacif. R. Rep. 5: 364. 1858.

Chamaesyce setiloba Millsp. in Parish, Cat. Pl. Salton Sink 6. 1913. Preprint from Carnegie Inst. Wash. Pub. No. 193: 110. 1914.

Euphorbia floccosiuscula M. E. Jones, Contr. West. Bot. No. 15: 145. 1929.

Annual, stems prostrate, villous, 6–15 cm. long, ultimate branchlets often with leaves and cyathia congested into dense small heads. Leaves 3–7 mm. long, oblong to oblong-ovate, entire, villous; stipules rudimentary; cyathia solitary; involucre 1 mm. in diameter, pubescent, slenderly urceolate; glands red, transversely oblong or the distal sometimes circular, 0.1–0.2 mm. long; fifth gland totally absent; sinus depressed halfway to base of involucre; appendages white, glabrous, about 1 mm. long and wide, parted into 3–5 narrow attenuate segments; staminate flowers 3–7; capsule sharply 3-angled, villous, globose, 1.2 mm. long; seeds brownish white, 0.9–1 mm. long, ovate-acute, quadrangular, angles sharp, facets with low irregular wrinkles.

Sandy desert washes and flats, Lower Sonoran Zone; Inyo County south to San Diego and Imperial Counties, California, east to Nevada and western Texas, south to Lower California and Sinaloa. Type locality: Fort Yuma, Imperial County, California. Jan.–May.

27. *Euphorbia pediculifera* Engelm. Louse Spurge. Fig. 3059.

Euphorbia pediculifera Engelm. Bot. Mex. Bound. 186. 1859.

Euphorbia conjuncta Millsp. Proc. Calif. Acad. II. 2: 227. 1889.

Euphorbia involuta Millsp. loc. cit.

Euphorbia vermiformis M. E. Jones, Contr. West. Bot. No. 16: 23. 1930.

Perennial, stems usually prostrate, 15–30 cm. long, appressed-pubescent. Leaves ovate to lanceolate, entire, densely appressed-pubescent to glabrate, 4–22 mm. long; stipules short, ventral



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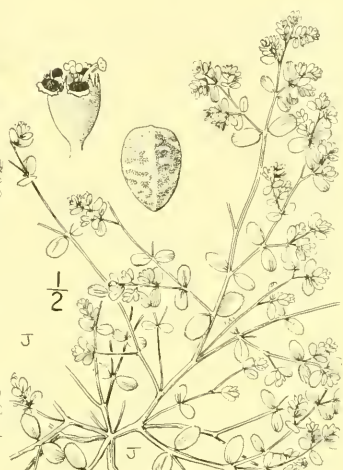
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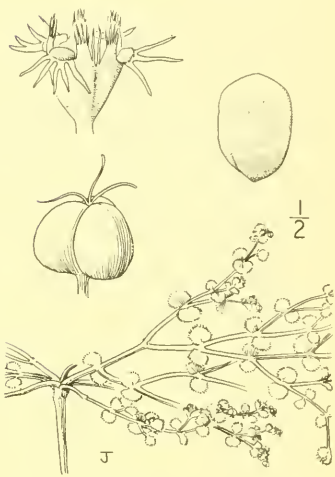
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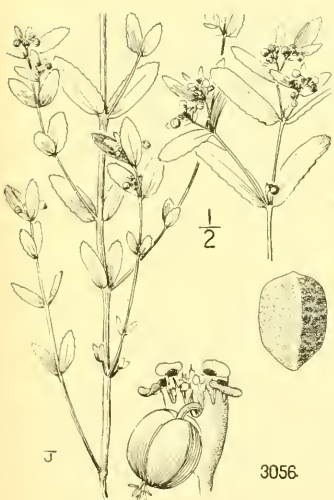
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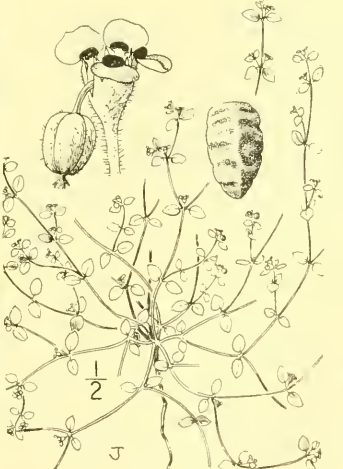
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3050. *Euphorbia polycarpa*
 3051. *Euphorbia micromera*
 3052. *Euphorbia Abramsiana*

3053. *Euphorbia glyptosperma*
 3054. *Euphorbia serpyllifolia*
 3055. *Euphorbia Hooveri*

3056. *Euphorbia maculata*
 3057. *Euphorbia arizonica*
 3058. *Euphorbia setiloba*

united, dorsal distinct; cyathia solitary; involucre campanulate, appressed-pubescent to glabrate, 1.5–2 mm. in diameter; glands dark red-purple, transversely oblong, 0.7–1.2 mm. long; fifth gland usually absent; sinus U-shaped, little depressed, hairy; appendages absent to conspicuous, white, glabrous, entire to lobed; staminate flowers 22–25; capsule strigose, 2 mm. long, sharply 3-angled, deltoid-ovoid; seeds white, 1–1.3 mm. long, slenderly ovoid, circumferentially 4–5 round-ridged.

Dry desert washes and flats, Lower Sonoran Zone; Colorado Desert, California, east to Arizona, south to Lower California and Sinaloa. Type locality: Sonoita Creek, Santa Cruz County, Arizona. Oct.–April.

28. *Euphorbia melanadenia* Torr. Squaw Spurge. Fig. 3060.

Euphorbia melanadenia Torr. Pacif. R. Rep. 4: 135. 1857.

Euphorbia cinerascens var. *appendiculata* Engelm. Bot. Mex. Bound. 186. 1859.

Euphorbia polycarpa var. *vestita* S. Wats. Bot. Calif. 2: 73. 1880.

Chamaesyce aureola Millsp. Field Mus. Bot. Ser. 2: 406. 1916.

Perennial, stems ascending or erect, to 20 cm. long, closely tomentose, glabrate. Leaves 3–9 mm. long, ovate to narrowly oblong, inequilateral, entire, closely and often hoary tomentose; stipules linear, hairy, ventral united, dorsal distinct; cyathia solitary; involucre open-campanulate, 1.2–1.5 mm. in diameter, appressed short-tomentose; glands dark reddish purple, 0.4–0.6 mm. long, transversely oblong; fifth gland absent; sinus U-shaped, not depressed, densely hairy; appendages rarely absent, usually conspicuous, white, glabrous, crenate to subentire; staminate flowers 15–20; capsule sharply 3-angled, very short-tomentose, ovoid, 1.5–1.7 mm. long; seeds white to brownish, 1.2–1.5 mm. long, ovate, sharply quadrangular, facets smooth or slightly wrinkled.

Dry hillsides, Upper Sonoran Zone; Los Angeles and San Diego Counties, California, east to Arizona and south to Lower California and Sonora. Type locality: "San Gabriel," California. Actually probably the foot of the San Gabriel Mountains a few miles north. Feb.–Nov.

29. *Euphorbia vallis-mortae* (Millsp.) J. T. Howell. Indian Spurge. Fig. 3061.

Chamaesyce vallis-mortae Millsp. Field Mus. Bot. Ser. 2: 403. 1916.

Euphorbia vallis-mortae J. T. Howell, Madroño 2: 19. 1931.

Perennial, hoary tomentose throughout; usually forming a dense rounded plant up to 15 cm. high. Leaves 4–8 mm. long, suborbicular to oblong-ovate, entire; stipules densely hairy, filiform, ventral united, dorsal distinct; cyathia solitary; involucre campanulate, 2 mm. in diameter, tomentose; glands reddish, transversely oblong, to 1 mm. long; fifth gland absent; sinus U-shaped, with long erect hairs; appendages conspicuous, white, entire to crenulate, pubescent beneath and on the margins and sparsely so above; staminate flowers 17–22; capsule sharply 3-angled, tomentose, globose, 2 mm. long; seeds white, 1.4–1.7 mm. long, sharply quadrangular, facets smooth.

Sandy desert, Lower Sonoran Zone; Inyo and Kern Counties, California. Type locality: near Indian Wells, Mojave Desert, Kern County, California. May–Oct.

30. *Euphorbia supina* Raf. Spotted Spurge. Fig. 3062.

Euphorbia supina Raf. Amer. Month. Mag. 2: 119. 1817.

Euphorbia maculata L. sensu American authors.

Euphorbia depressa Torr. Cat. Pl. N.Y. 45. 1819.

Chamaesyce supina Moldenke, Annot. & Class. List Moldenke Nos. 135. 1939.

Annual, stems usually prostrate, villous, 10–45 cm. long. Leaves 4–17 mm. long, oblong-ovate to oblong-linear, larger inequilateral, sparsely villous, often glabrate above, serrulate; stipules distinct, 2–3-parted, villous; cyathia solitary but mostly borne on short congested lateral branches; involucre 0.8 mm. in diameter, villous, obconical; glands 0.15–0.25 mm. long, transversely elongate; fifth gland filiform; sinus U-shaped, depressed, long-hairy; appendages narrow, white, glabrous, irregularly crenulate; staminate flowers 2–5; capsule sharply 3-angled, strigose, often partially glabrate, globose, 1.4 mm. long; seeds whitish brown, 1–1.2 mm. long, ovate, sharply quadrangular, facets with irregular transverse ridges often slightly including the angles.

A mainly urban weed introduced from the eastern United States; western Oregon, cismontane California. Type locality: "Very common on the dunes and seashores of Long-Island, north and south, also in New-Jersey, Sandy-Hook, &c." June–Sept.

Family 80. CALLITRICHACEAE.

WATER-STARWORT FAMILY.

Aquatic or rarely terrestrial herbs, with very slender stems. Leaves opposite, entire, spatulate or linear, without stipules. Flowers small, axillary, perfect or monoecious, with or without 2 sac-like bracts. Perianth wanting. Stamen 1, with a filiform elongated filament, and cordate 2-celled anthers opening by longitudinal slits. Pistil solitary, sessile or peduncled; styles 2; ovary 4-celled, with a single ovule in each cavity. Fruit compressed and lobed, the lobes more or less winged or

keeled, dehiscent into 4 flattened 1-seeded carpels. Seed pendant, anatropous; endosperm present, fleshy; embryo straight or slightly curved.

The family consists of a single genus, of doubtful affinities. Some botanists place it in the *Haloragidaceae*.

1. *CALLITRICHE* L. Sp. Pl. 969. 1753.

Characters of the family. [Name Greek, meaning beautiful hair, in reference to the slender graceful stems.]

About 20 species of wide geographic range. Type species, *Callitriche palustris* L.

Fruit sessile or subsessile.

Fruit 2-bracted; emerged leaves obovate; styles erect.

Styles shorter than the fruit.

Styles about twice as long as the fruit.

Fruit bractless; leaves all submerged and linear.

Fruit distinctly peduncled; plants mainly terrestrial and leaves mainly spatulate or

Bracts absent; peduncles seldom over 8 mm. long.

Bracts present; peduncles filiform, often becoming 2-3 cm. long.

1. *C. palustris*.

2. *C. Bolanderi*.

3. *C. autumnalis*.

obovate.

4. *C. marginata*.

5. *C. longipedunculata*.

1. *Callitriche palustris* L. Vernal Water-starwort. Fig. 3063.

Callitriche palustris L. Sp. Pl. 969. 1753.

Callitriche verna L. Fl. Suec. ed. 2. 4. 1755.

Callitriche palustris var. *verna* Fenley ex Jepson, Fl. Calif. 2: 435. 1936.

Slender perennial growing in water or in mud, the stems very slender, 5-25 cm. long. Submerged leaves linear, retuse at the apex, 1-2 cm. long, with a single unbranched nerve; floating leaves obovate, or narrowed at base to a short winged petiole, dotted with minute stellate scales, the nerve pinnately branched; fruit 2-bracted, sessile, oblong-obovoid, longer than broad, about 1.5 mm., sharply keeled on the back and usually narrowly winged at the apex; styles erect, shorter than the fruit.

Quiet cool water, mainly Transition and Boreal Zones; Alaska to southern California and across the continent; also in Eurasia. Type locality: Europe. July-Sept.

2. *Callitriche Bolanderi* Hegelm. Bolander's Water-starwort. Fig. 3064.

Callitriche Bolanderi Hegelm. Bot. Ver. Brandenb. 10: 114. 1868.

Callitriche stenocarpa Hegelm. loc. cit.

Callitriche palustris var. *Bolanderi* Jepson, Fl. Calif. 2: 435. 1936.

Similar to the preceding species. Floating leaves rhombic-obovate, abruptly narrowed to the petiole; fruit about 1 mm. long, and as broad or usually a little broader, orbiculate or with a rather narrow sinus at apex, obtusely angled on the back; styles very slender, erect, about twice as long as the fruit.

Quiet water of streams or ponds, Transition and Boreal Zones; British Columbia to California. This species is very closely related to and possibly conspecific with *Callitriche heterophylla* Pursh of the Eastern States. Type locality: Placer County, California. April-Sept.

3. *Callitriche autumnalis* L. Autumnal or Northern Water-starwort. Fig. 3065.

Callitriche autumnalis L. Sp. Pl. 696. 1753.

Callitriche bifida Morong, Mem. Torrey Club 5: 215. 1894.

Submersed perennial herb, the slender stems 1-2 dm. long. Leaves all linear, 5-15 mm. long, notched at the apex, with a single unbranched nerve; floral bracts none; fruit sessile or subsessile, 2-2.5 mm. wide, orbicular, flattened, the lobes broadly winged, with a deep narrow sinus at apex and a narrow groove between them; stigmas as long as or longer than the fruit, reflexed, early deciduous.

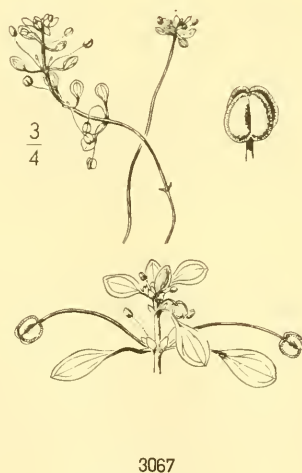
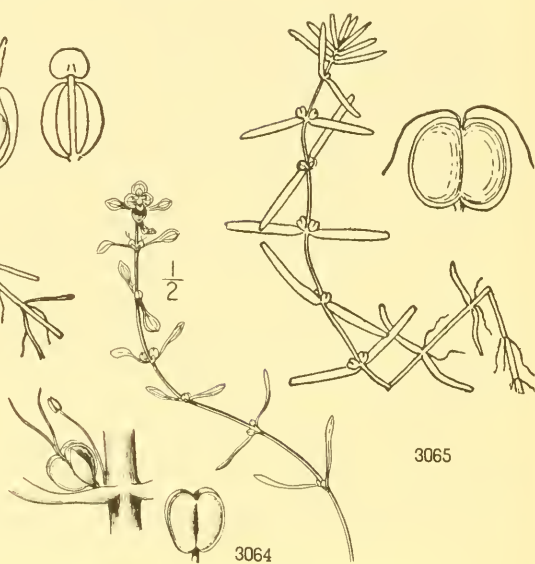
Still water of lakes and streams, mainly Boreal Zones; Alaska to California and across the continent; also in Eurasia. Type locality: Europe. May-Sept.

4. *Callitriche marginata* Torr. California Water-starwort. Fig. 3066.

Callitriche marginata Torr. Pacif. R. Rep. 4: 135. 1857.

Plants growing in mud, forming mats on the margins of pools, the stems slender, 5-10 cm. long, rarely growing in water. Leaves on terrestrial plants all broadly spatulate, and abruptly narrowed to the petiole, 3-nerved, on the aquatic plants the submersed linear and the floating spatulate; peduncles spreading, 3-8 mm. long; fruit 1 mm. long, and a little broader, emarginate at both the apex and base, the lobes with a thin margin or narrow wing on the back; styles slender, as long as the fruit or longer, reflexed, early deciduous.

Borders of pools in mud, or submerged in shallow water, mainly Upper Sonoran Zone; California Coast Ranges and Sierra Nevada foothills from Humboldt and Merced Counties to San Diego County, California. Type locality: Mark West Creek, Sonoma County, California. March-June.



3068

3059. *Euphorbia pediculifera*
3060. *Euphorbia melanadenia*
3061. *Euphorbia vallis-mortae*

3062. *Euphorbia supina*
3063. *Callitriche palustris*
3064. *Callitriche Bolanderi*
3065. *Callitriche autumnalis*

3066. *Callitriche marginata*
3067. *Callitriche longipedunculata*
3068. *Simmondsia chinensis*

5. *Callitriche longipedunculata* Morong. Long-stalked Water-starwort.

Fig. 3067.

Callitriche longipedunculata Morong, Bull. Torrey Club 18: 236. 1891.*Callitriche marginata* var. *longipedunculata* Jepson, Man. Fl. Pl. Calif. 603. 1925.

Stems very slender and thread-like, forming mats. Leaves all spatulate or oblanceolate, 3-8 mm. long, rounded at the apex, the blade 3-nerved, the lateral nerves uniting near the apex; bracts present; peduncles very slender, becoming 10-30 mm. long in fruit, frequently 2 or 3 from the same axil; fruit thick, nearly orbicular, 1 mm. or less in length, a little broader than long, minutely emarginate at apex, the lobes divergent with a deep intervening groove, with or without a narrow wing.

Growing in the bottom of desiccated winter pools, mainly Upper Sonoran Zone; Sierra Nevada foothills, south to San Diego County, California. Type locality: on mesas, San Diego, California. March-May.

Family 81. BUXACEAE.

Box FAMILY.

Monoecious or dioecious trees, shrubs or perennial herbs, with watery sap. Leaves mostly evergreen, alternate or opposite, simple. Flowers solitary or clustered, regular, bracted. Calyx present or none. Petals none. Staminate flowers with 4-7 stamens, sometimes with a rudimentary pistil. Pistillate flowers with mostly 3-celled (2-4-celled) ovary, with 1 or 2 anatropous ovules in each cell; styles as many as the ovary cells, simple. Fruit a capsule or drupe; endosperm fleshy or scanty; embryo straight.

A family of 7 genera and about 30 species, only the following, *Pachysandra* and *Buxus*, in North America.

1. *SIMMÓNDISIA* Nutt. Lond. Journ. Bot. 3: 401. *pl.* 16. 1844.

Monoecious shrubs, with opposite, entire, evergreen leaves. Flowers on short axillary peduncles, the pistillate solitary, the staminate in capitate clusters. Sepals 4-6, usually 5. Stamens 10-12. Ovary 2-3-celled; styles of the same number as the ovary cells; ovules 1 or 2 in each cell. Fruit a capsule, with a firm wall, partly enclosed by the persistent sepals. [Name in honor of F. W. Simmonds, English botanist and naturalist.]

A monotypic genus of the arid southwestern United States and adjacent Mexico.

1. *Simmondsia chinensis* (Link) Schneider. Jojoba or Goat-nut. Fig. 3068.*Buxus chinensis* Link, Enum. Hort. Ber. 2: 386. 1822.*Simmondsia californica* Nutt. Lond. Journ. Bot. 3: 401. *pl.* 16. 1844.*Simmondsia chinensis* Schneider, Handb. Laubholz. 2: 141. 1907.

Shrub, 1-2.5 m. high, the branches rigid, the branchlets and peduncles pubescent. Leaves oblong-elliptic to ovate, 2-4 cm. long, leathery, dull green and somewhat canescently puberulent; sepals of the staminate flowers 3-4 mm. long, those of the pistillate 10-12 mm. long; capsule nut-like, oblong-ovoid, 15-20 mm. long.

Dry bushy hills and mesas, Lower Sonoran Zone; southwestern San Diego County, California, south to central Lower California and east to southern Arizona and adjacent Sonora. Type locality: erroneously attributed to China in the original description. Feb.-May.

Family 82. EMPETRACEAE.

CROWBERRY FAMILY.

Low evergreen, heath-like shrubs, with small slender narrow leaves, jointed to short pulvini, the margins revolute. Flowers dioecious or rarely polygamous, axillary or terminal. Sepals 3. Petals 2 or 3, or none. Staminate flowers with 2-4 stamens, with filiform filaments and 2-celled anthers dehiscing by longitudinal slits. Ovary of the pistillate flowers 2- to several-celled; style cleft into as many lobes as there are ovary cells; ovules 1 in each cell, amphitropous. Fruit a berry, containing 2 to several 1-seeded nutlets. Endosperm copious; embryo straight.

A family of 3 genera and 4 or 5 species, natives of the colder parts of the northern hemisphere and South America.

1. *ÉMPETRUM* Dumort. Fl. Belg. 106. 1827.

Prostrate or spreading, freely branching half-shrubs, the stems largely herbaceous, densely leafy. Flowers inconspicuous, solitary in the upper axils. Sepals and petals usually 3. Staminate flowers with 3 stamens; anthers introrse. Ovary of the pistillate

flowers globose, 6-9-celled. Berry black or red, with 6-9 nutlets. [Name Greek, meaning on rocks, in reference to the habitat of these plants.]

A monotypic genus of wide distribution.

1. *Empetrum nigrum* L. Black Crowberry or Heathberry. Fig. 3069.

Empetrum nigrum L. Sp. Pl. 1022. 1753.

The spreading branches diffuse, 2-25 cm. long, glabrous, or the young shoots pubescent. Leaves crowded, linear-oblong, obtuse, 4-7 mm. long, dark green, the strongly revolute margins roughish; flowers minute, purplish; berry 4-6 mm. in diameter, black or red in the arctic form.

Moist rocky places, Boreal Zones; Alaska to Greenland and southward to the coast of northwestern California, Michigan, New England, and northern New York; also in Europe, Asia, and Chile. In the Pacific States it is found sparingly along the coast and on Mt. Rainier, Washington. Type locality: Europe. June-July.

Family 83. LIMNANTHACEAE.

MEADOW-FOAM FAMILY.

Annual herbs, with pungent juice and alternate pinnately dissected exstipulate leaves. Flowers solitary in the axils, bractless, regular and perfect. Sepals 3-5, persistent, valvate. Petals 3-5, marcescent. Stamens 6-10, more or less perigynous on the shallow thickened saucer-shaped hypanthium, those opposite the sepals with a gland at the base. Pistil 3-5-carpellate, the ovaries distinct, the styles united, arising from the inner bases of the ovaries. Fruit of 3-5 more or less tuberculate nutlets. Seeds anatropous, erect; endosperm none; embryo straight.

A North American family of 2 genera and about 12 species.

Flowers 4-5-merous; petals truncate or emarginate.

1. *Limnanthes*.

Flowers 3-merous; petals obtuse or acute.

2. *Floerkea*.

1. *LIMNANTHES* R. Br. Phil. Mag. III. 2: 70. 1833.

Low, usually glabrous annuals, branching from the base, growing in wet places. Leaves simply or usually doubly pinnatifid. Flowers solitary in the axils, usually showy, borne on straight rather stout pedicels. Sepals 5 (rarely 4), ascending, valvate in the bud. Petals as many as sepals, white or yellow, sometimes tinged with rose, especially in age, convolute in aestivation. Stamens 10 (rarely 8). Ovaries 5 (rarely 4), and the style as many cleft. [Name from the two Greek words meaning marsh and flower, in reference to the habitat.]

A genus of 11 species restricted to the Pacific States and Vancouver Island. Type species, *Limnanthes Douglasii* R. Br.

Petals well exceeding the lanceolate or subulate-lanceolate sepals.

Nutlets without whitish scales.

Nutlets with a few tubercles or wrinkles at summit or sometimes smooth throughout; petals white or yellow below and white above the middle.

Base of petals with a row of cilia on the margins.

Veins of petals purple or brownish purple; leaflets 5 or more, lobed or divided into narrow acute or acutish segments or teeth.

Basal leaves mostly 7-10 cm. long; Coast Ranges.

1. *L. Douglasii*.

Basal leaves mostly 2.5-5 cm. long; Sierra Nevada.

2. *L. striata*.

Veins of the petals pellucid; leaflets 3-5, broadly oval or ovate, obtuse and entire.

3. *L. Bakeri*.

Base of petals without a band of cilia on the margins.

Nutlets wrinkled at summit; petals cream-colored, often flushed with pink above, truncate at apex.

4. *L. versicolor*.

Nutlets with a few tubercles at summit; petals white, obtuse at apex.

5. *L. montana*.

Nutlets covered all over with low broad tubercles, not at all scarious.

6. *L. Howelliana*.

Nutlets bearing thin scarious scale-like tubercles.

Nutlets with a few whitish scale-like tubercles at apex, otherwise smooth or slightly wrinkled.

Sepals long-villous especially on the inner surface.

7. *L. alba*.

Sepals glabrous on both surfaces; petals aging rose-colored at apex.

8. *L. gracilis*.

Nutlets densely covered all over with scarious scale-like tubercles; petals aging rose-colored; sepals glabrous.

9. *L. rosea*.

Petals shorter than or scarcely equaling the sepals, obtuse at apex.

Sepals glabrous.

10. *L. pumila*.

Sepals floccose-villous, especially so within.

11. *L. floccosa*.

1. *Limnanthes Douglasii* R. Br. Common Meadow-foam. Fig. 3070.

Limnanthes Douglasii R. Br. Phil. Mag. III. 2: 70. 1833.

Limnanthes sulphurea Loud. Encycl. Pl. 1543. 1855.

Floerkea Douglasii Baillon, Adansonia 10: 362. 1873.

Stems much branched near the base, decumbent to erect, 10-30 cm. long, glabrous. Leaves

glabrous, 1-2-pinnatifid, the divisions of the lower oblong, those of the upper lanceolate or linear-lanceolate; sepals lanceolate, 6-10 mm. long, glabrous; petals yellow toward the base, white above, 10-15 mm. long, emarginate or sometimes truncate; nutlets smooth or slightly wrinkled and often crowned with a few conical tubercles.

Wet places, Upper Sonoran Zone; Humboldt County to San Luis Obispo County, California. Type locality: probably in central California. Collected by Douglas. April-May.

2. *Limnanthes striata* Jepson. Foothill Meadow-foam. Fig. 3071.

Limnanthes striata Jepson, Fl. Calif. 2: 411. 1936.

Stems several-branched from the base, 10-30 cm. high, glabrous. Leaves glabrous, the lower 4-10 cm. long including the petiole, odd-pinnately divided, the divisions 5-9, incisedly toothed or lobed, rarely entire; sepals linear-lanceolate, 6-7 mm. long, glabrous; petals white above, greenish yellow toward the base, striate nearly to the summit with usually 7 brownish purple veins, obovate-spatulate, 8-12 mm. long, the claws with 2 vertical rows of hairs on the inner surface; nutlets brown, sparsely beset at summit with short triangular scale-like protuberances, otherwise nearly smooth.

Open moist ground, Upper Sonoran Zone; foothills of the Sierra Nevada, Eldorado County to Tuolumne County, California. Type locality: Willow Springs Station, Amador County, California. March-May.

3. *Limnanthes Bakeri* J. T. Howell. Baker's Meadow-foam. Fig. 3072.

Limnanthes Bakeri J. T. Howell, Leaflets West. Bot. 3: 206. 1943.

Plant glabrous and flaccid, stems erect, 8-20 cm. high, simple or rarely with 1 or 2 shorter branches from near the base. Basal leaves few, 3-5 cm. long, often withering at flowering time, those subtending the peduncles similar; leaflets 3-5, ovate to oblong-elliptic, entire, 6-10 mm. long; peduncles, at least the lower elongated, 6-8 cm. long; sepals broadly lanceolate, 6-8 mm. long; petals cuneate, 6-9 mm. long, pale yellow with white tips and pellucid veins; stamens 2.5-5.3 mm. long; nutlets 2-3 mm. long, the summit covered with small acutish tubercles.

Wet meadows, Humid Transition Zone; Mendocino County, California. Type locality: about 3 miles north of Willits, Mendocino County. March-May.

4. *Limnanthes versicolor* (Greene) Rydb. Shasta Meadow-foam. Fig. 3073.

Floerkea versicolor Greene, Erythea 3: 62. 1895.

Limnanthes versicolor Rydb. N. Amer. Fl. 25: 99. 1910.

Plants glabrous throughout, stems 1 to several from the base, firmly erect, 1-3 dm. high. Basal leaves erect, 3-5 cm. long, those subtending the pedicels similar but smaller; leaflets 3-7, linear to narrowly oblong, acute at both ends, 5-12 mm. long, entire or those of the smaller uppermost leaves fewer and toothed; flowers almost corymbose, the lower pedicels spreading and 3-5 cm. long; sepals broadly to rather narrowly lanceolate, 6-8 mm. long, slightly acuminate at apex, glabrous; petals 12-15 mm. long, cream-yellow with lilac-colored tips; nutlets wrinkled on the summit, without tubercles or scales.

Moist places along streams, Upper Sonoran Zone; Shasta County, California. Type locality: Cedar Run, Shasta County. April-May.

Limnanthes versicolor var. *Parishii* Jepson, Fl. Calif. 2: 412. 1936. Pedicels ascending rather than spreading; sepals all broadly lanceolate, less acuminate; wrinkles on the summit of the nutlets finely granulate. Cuyamaca Mountains, San Diego County, California. Type locality: Stonewall Mine, San Diego County.

5. *Limnanthes montana* Jepson. Mountain Meadow-foam. Fig. 3074.

Limnanthes montana Jepson, Fl. Calif. 2: 412. 1936.

Stems 1 to several from the base, 10-25 cm. high, slender, glabrous. Lower leaves 3-5 cm. long, glabrous, the divisions mostly 7, at least the lower ones 3-toothed or -lobed; sepals glabrous or very sparsely villous, 5 mm. long, ovate-lanceolate, acuminate; petals white, spatulate-obovate, obtuse at the apex, 7 mm. long, 2-2.5 mm. wide; nutlets long-obovoid, with several acute protuberances on the summit.

Springs and bogs, Upper Sonoran and Arid Transition Zones; southern Sierra Nevada, on the Tule River watershed, 2,000-5,500 feet altitude, Tulare County, California. Type locality: Oriole Lake, Sequoia National Park. March-May.

6. *Limnanthes Howelli*ana Abrams. Umpqua Meadow-foam. Fig. 3075.

*Limnanthes Howelli*ana Abrams, Madroño 6: 27. 1941.

Stems 1 to several from the base, 15-25 cm. high, rather succulent, glabrous. Leaves glabrous, the lower 5-8 cm. long, lower divisions 2-3-lobed, the upper entire, linear-oblong or linear; sepals lanceolate, acute, 7-8 mm. long, glabrous; petals white with yellow base, obovate, 12-16 mm. long, 6-7 mm. wide at the subtruncate broadly emarginate apex, 9-nerved below, sparsely long-villous below the middle; nutlets thickly beset all over with broad mammilliform tubercles.

Open, wet ground, Upper Sonoran and Humid Transition Zones; Douglas and northern Josephine Counties, Oregon. Type locality: roadside and fields near Wilbur, Douglas County, Oregon. March-May.



3069



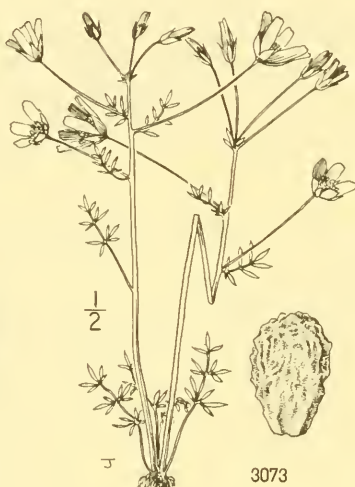
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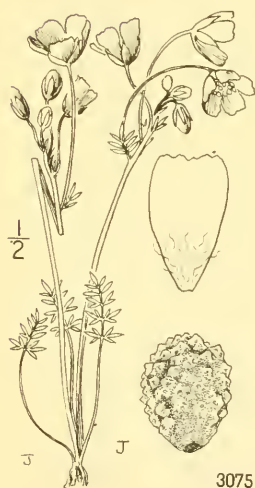
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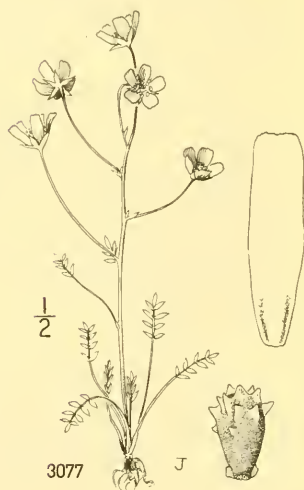
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3069. *Empetrum nigrum*
 3070. *Limnanthes Douglasii*
 3071. *Limnanthes striata*

3072. *Limnanthes Bakeri*
 3073. *Limnanthes versicolor*
 3074. *Limnanthes montana*

3075. *Limnanthes Howelliana*
 3076. *Limnanthes alba*
 3077. *Limnanthes gracilis*

7. *Limnanthes álba* Hartw. White Meadow-foam. Fig. 3076.

Limnanthes álba Hartw. ex Benth. Pl. Hartw. 301. 1848.

Floerkea álba Greene, Fl. Fran. 100. 1891.

Limnanthes álba var. *detonsa* Jepson, Fl. Calif. 2: 411. 1936.

Stems much branched at the base, erect or ascending, 10–30 cm. long. Leaves 1–2-pinnatifid, 3–10 cm. long, sparsely long-villous or glabrous, the segments oblong or lanceolate; pedicels 2–10 cm. long; sepals ovate-lanceolate, acuminate, 6–8 mm. long, usually villous with long white hairs; petals 10–15 mm. long, broadly obovate-cuneate, truncate or broadly emarginate, white; nutlets 4 mm. long, reddish brown, with low ridged tubercles.

Wet places, Upper Sonoran Zone; Sierra Nevada foothills and Sacramento Valley and adjacent foothills in the Coast Ranges, from Shasta County to Tuolumne County, California. Type locality: Sacramento Valley. April–May.

8. *Limnanthes grácilis* Howell. Slender Meadow-foam. Fig. 3077.

Limnanthes grácilis Howell, Fl. N.W. Amer. 108. 1897.

Plant glabrous throughout, the stems slender, simple or branched from the base, 8–40 cm. long. Leaves pinnate, 3–5 cm. long, the divisions ovate to linear-lanceolate, entire or the lower 3-parted; sepals lanceolate, acuminate, 6 mm. long; petals white with yellowish base, oblanceolate, 12–14 mm. long, truncate or broadly emarginate at apex; nutlets smooth or crowned with a few low tubercles.

Wet ground, especially on serpentine outcrops, Upper Sonoran and Transition Zones; Rogue River region near Grants Pass and Waldo, Oregon. Type locality: "wet rocks, Rogue River Valley and southward." March–May.

9. *Limnanthes ròsea* Hartw. Rose-flowered Meadow-foam. Fig. 3078.

Limnanthes ròsea Hartw. ex Benth. Pl. Hartw. 302. 1848.

Floerkea ròsea Greene, Fl. Fran. 100. 1891.

Limnanthes ròsea var. *candida* Jepson, Fl. Calif. 2: 411. 1936.

Stems much branched at the base, decumbent or ascending, 10–30 cm. long, glabrous. Leaves 5–10 cm. long, glabrous, once or twice pinnately dissected into narrow linear divisions; sepals lanceolate, 7–8 mm. long; petals 12–18 mm. long, white, veined with rose, and often tinged with rose in age, broadly emarginate, villous toward the base; nutlets with high prominent tubercles laterally ridged.

Wet places, Upper Sonoran Zone; Sacramento Valley and the upper San Joaquin Valley, California. Type locality: upper Sacramento Valley. April–May.

10. *Limnanthes pùmila* Howell. Dwarf Meadow-foam. Fig. 3079.

Limnanthes pùmila Howell, Fl. N.W. Amer. 108. 1897.

Limnanthes Bellingeriana M. E. Peck, Proc. Biol. Soc. Wash. 50: 93. 1937.

Plant glabrous throughout, the stems simple to sparingly branched near the base, 5–10 cm. high. Lower leaves 3–4 cm. long, pinnately divided into 5–9 linear-lanceolate divisions, these entire or the lower sometimes 3-lobed; sepals lanceolate to ovate-lanceolate, 6–8 mm. long; petals white, about equaling the sepals, oblong, obtuse, not emarginate at apex; nutlets ovoid, rugose below, crowned with short conic processes at apex.

Moist ground, Transition Zone; Pinehurst and Table Rock, Jackson County, Oregon. Type locality: top of Table Rock. March–May.

11. *Limnanthes floccòsa* Howell. Woolly Meadow-foam. Fig. 3080.

Limnanthes floccosa Howell, Fl. N.W. Amer. 108. 1897.

Stems sparingly branched, 3–7 cm. long, decumbent, sparsely pilose. Leaves 2–5 cm. long, pinnatifid, sparsely pilose; sepals ovate, acuminate, 7–8 mm. long, densely long-villous, especially on the inner surface; petals not exceeding the sepals, white, truncate; nutlets obovoid, the upper half beset with acute white processes.

Wet places, Upper Sonoran Zone; southern Oregon, in Jackson and Josephine Counties. Type locality: on gravelly plains, Jackson County, Oregon. April–May.

Limnanthes Macounii Trelease, Mem. Bost. Soc. Nat. Hist. 4: 85. 1887. Plants glabrous; flowers 4-merous; petals 3–4 mm. long, white or cream-colored, crose-retuse; nutlets with prominent conical tubercles. This unique species is known only from the type locality on Vancouver Island, British Columbia. It is possible that it may be found in adjacent Washington.

2. *FLOÉRKEA* Willd. Neue Schrift. Ges. Nat. 3: 448. 1801.

Low slender glabrous annuals, the stems simple or branched at the base. Leaves pinnately dissected. Flowers solitary on axillary, arcuate, recurved pedicels. Sepals 3, slightly imbricated in the bud, spreading in fruit. Petals 3, much shorter than the sepals, open in aestivation. Stamens 6. Carpels 2 or 3; style 2–3-cleft at the apex. [Name in honor of H. G. Floerke, 1790–1835, a German botanist.]

A monotypic North American genus.

1. *Floerkea proserpinacoides* Willd. False Mermaid. Fig. 3081.*Floerkea proserpinacoides* Willd. Neue Schrift. Ges. Nat. 3: 449. 1801.*Floerkea occidentalis* Rydb. Mem. N.Y. Bot. Gard. 1: 268. 1900.

Stems slender, weak, 1-4 dm. long. Leaves pinnate, slender-petioled, 2-7 cm. long; leaflets usually 5, distant, lanceolate to linear-oblong; sepals lanceolate, 3-5 mm. long; petals half the length of the sepals, oblong, white; fruiting carpels nearly globular, 3 mm. in diameter, tuberculate above.

Wet places, Transition Zone; Kittitas County, Washington, to the central Sierra Nevada, California, east to Quebec, Missouri, and New Jersey. Type locality: Pennsylvania. April-June.

Family 84. ANACARDIACEAE.

SUMAC FAMILY.

Trees or shrubs, with a resinous or milky and usually acrid juice. Leaves alternate or rarely opposite, simple or compound, persistent or deciduous. Flowers commonly regular, perfect or polygamo-dioecious. Calyx 3-7-lobed. Petals of the same number as the calyx-lobes, imbricated in the bud, rarely wanting. Stamens as many or twice as many as the petals, rarely fewer or more, inserted at the base of the annular disk. Ovary in the pistillate flowers 1-celled or sometimes 4-5-celled; styles 1-3; ovules 1 in each cell. Fruit usually a small drupe. Seeds with a bony or crustaceous testa; endosperm scanty or none.

A family of about 50 genera and 400 species, most abundant in the warm temperate and tropical regions.

1. RHÚS L. Sp. Pl. 265. 1753.

Shrubs or small trees, with alternate, simple or compound leaves. Flowers polygamous, in axillary or terminal panicles. Calyx-lobes 4-6, usually 5, persistent. Petals imbricated in the bud, spreading in anthesis. Disk annular. Stamens 5. Ovary 1-celled, 1-ovuled; styles 3, terminal. Drupe small, subglobose or compressed, pubescent or glabrous, the exocarp persistent or deciduous. Seed solitary, inverted on a stalk that rises from the base of the ovary. [Ancient classical name.]

About 120 species, inhabiting the temperate and tropical regions, most abundant in South Africa. Type species, *Rhus Coriaria* L.

Leaves compound, deciduous.

Leaves odd-pinnate; leaflets 11-31.

Leaves 3-foliolate.

Ovary and fruit glabrous; exocarp exfoliating; stone ribbed; plants poisonous.

Panicles lax and open; leaflets rounded or obtuse at apex.

Panicles dense; leaflets acuminate at apex.

Ovary and fruit pubescent; exocarp persistent; stone smooth; plants not poisonous.

Leaves simple, persistent.

Ovary and fruit pubescent and viscid; stone smooth, compressed.

Leaves oval, very obtuse at both ends; exocarp of fruit acid to taste.

Leaves ovate, acute at apex; exocarp of fruit sweetish to taste.

Ovary and fruit glabrous; stone rugose along one edge, not compressed.

1. *R. glabra*.2. *R. diversiloba*.3. *R. radicans*.4. *R. trilobata*.5. *R. integrifolia*.6. *R. ovata*.7. *R. laurina*.1. *Rhus glabra* L. Smooth or Scarlet Sumac. Fig. 3082.*Rhus glabra* L. Sp. Pl. 265. 1753.

Shrub or small tree, 1-6 m. high, glabrous and somewhat glaucous. Leaflets 11-31, lanceolate or oblong-lanceolate, 2.5-10 cm. long, acuminate, sharply serrulate; inflorescence a large dense terminal panicle; flowers greenish, about 3 mm. broad; drupe compressed, about 4 mm. in diameter, covered with short reddish hairs.

A variable and widely distributed species, ranging from Nova Scotia to Florida and westward to British Columbia and the Pacific States. In the Pacific States two forms are found which may deserve subspecific rank: *Rhus glabra* var. *occidentalis* Torr. (Bot. Wilkes Exp. 257. 1862-74.) occurs in the Upper Sonoran Zone of eastern Washington and northeastern Oregon. Another form of the Arizona type, *Rhus calophylla* Greene (Rep. Nov. Spec. 5: 45. 1908.) occurs in Chino Canyon near Palm Springs, southern California. Type locality: eastern North America. May-July.

2. *Rhus diversiloba* Torr. & Gray. Pacific Poison Oak. Fig. 3083.*Rhus diversiloba* Torr. & Gray, Fl. N. Amer. 1: 218. 1838.*Toxicodendron diversilobum* Greene, Leaflets Bot. Obs. 1: 119. 1905.

An erect shrub, 1-3 m. high or in forests becoming a vine and ascending trees by means of aerial roots to a maximum height of 40 m. or more. Leaves 3-foliolate, deciduous; leaflets ovate, obovate or elliptical, obtuse or rounded at the apex, variously lobed or toothed, or rarely entire, the lateral ones usually sessile; panicles axillary, loosely flowered and drooping or spreading;

pedicels slender; drupes 4-6 mm. in diameter, glabrous, with a thin deciduous epicarp and a waxy persistent mesocarp; stone striate.

Borders of streams, thickets and wooded slopes, Upper Sonoran and Transition Zones; western Washington to northern Lower California, Sonora and Michoacan. A variable species as to shape and size of leaflets and to the amount of pubescence, and a number of species have been proposed. Type locality: "Oregon." April-May.

3. *Rhus radicans* L. Poison Ivy. Fig. 3084.

Rhus radicans L. Sp. Pl. 266. 1753.

Rhus Toxicodendron L. loc. cit. in part. 1753.

Toxicodendron hesperium Greene, Leaflets Bot. Obs. 1: 118. 1905.

Shrub 0.5-1 m. high, sometimes climbing but not vine-like. Leaves 3-foliolate, deciduous, 1-3 dm. long, petioles as long as or longer than the leaflets; leaflets all petiolulate, sometimes pilose, ovate, acuminate, 5-15 cm. long, entire or sometimes remotely repand-dentate; axillary racemes compact, the pedicels short; drupes 5-7 mm. in diameter.

Dry rocky canyons and talus slopes, Upper Sonoran and Arid Transition Zones; eastern Washington and Oregon east to the Atlantic seaboard and south to Mexico and the Bahama Islands. A variable species from which a number of species and varieties have been segregated. Type locality: Virginia. June-Aug.

4. *Rhus trilobata* Nutt. Squaw Bush or Skunk Bush. Fig. 3085.

Rhus trilobata Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 219. 1838.

Rhus aromatica var. *trilobata* A. Gray, Amer. Journ. Sci. II. 33: 408. 1861.

Schmalzia trilobata Small, Fl. S.E.U.S. 728. 1903.

Low branching erect shrub, rather strongly aromatic, the young branchlets pubescent. Leaves 3-foliolate, deciduous, more or less pubescent on both surfaces; terminal leaflet 2.5-5 cm. long, 3-lobed and coarsely toothed, the lateral leaflets smaller, round-ovate, scarcely lobed, crenate; flowers yellowish, appearing before the leaves in short spike-like clusters; drupe viscid-hirsute, reddish.

Dry hillsides and plains, Upper Sonoran Zone; Oregon to northern Lower California, east to the Great Plains. A variable species especially as to pubescence and size of leaf, and a number of species and varieties have been proposed. It is closely related to *Rhus aromatica* Ait. of the eastern United States. Type locality: in the Rocky Mountains. Feb.-April.

5. *Rhus integrifolia* (Nutt.) Benth. & Hook. Lemonade Bush or Coast Sumac. Fig. 3086.

Styphonia integrifolia Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 220. 1838.

Styphonia serrata Nutt. ex Torr. & Gray, loc. cit.

Rhus integrifolia Benth. & Hook. f. ex Rothrock in Wheeler Rep. 84. 1878.

Neostyphonia integrifolia Shafer in Britton, N. Amer. Trees 612. 1908.

Evergreen shrub, 1-3 m. high, aromatic, with short stout and rather stiff branchlets. Leaves oval, rigid-coriaceous, very obtuse at both ends, entire or sometimes serrate, 2.5-4 cm. long, dark green above, paler beneath; inflorescence and young parts canescently puberulent; flowers white or rose-colored, glomerate, subtended by orbicular bracts within which are 2 thinner bractlets; sepals scarious-margined, ciliate; drupes very viscid and acid, about 10 mm. in diameter, compressed.

Bluffs along the coast, and in its southern range, extending inland into the chaparral belt of the mountains, Upper Sonoran Zone; Santa Barbara County, California, to northern Lower California. Type locality: on the margins of cliffs near the sea around San Diego and Santa Barbara, California. March-May.

6. *Rhus ovata* S. Wats. Sugar Bush or Chaparral Sumac. Fig. 3087.

Rhus ovata S. Wats. Proc. Amer. Acad. 20: 358. 1885.

Neostyphonia ovata Abrams, Bull. N.Y. Bot. Gard. 6: 403. 1910.

Evergreen shrub, 1.5-3 m. high, with rather stout glabrous branchlets. Leaves rigid-coriaceous, smooth and shining, ovate or subcordate, acute at apex, entire or sharply serrate; inflorescence glabrous or glabrate; bracts suborbicular with 2 smaller bractlets within; sepals obscurely or not at all ciliate; drupes glandular and viscid, the pulp sweetish to the taste, 8 mm. in diameter, compressed.

Chaparral belt, Upper Sonoran Zone; Santa Barbara County, California, to northern Lower California and Arizona. Type locality: not definitely stated in the original publication. March-May.

7. *Rhus laurina* Nutt. Laurel Sumac. Fig. 3088.

Rhus laurina Nutt. in Torr. & Gray, Fl. N. Amer. 1: 219. 1838.

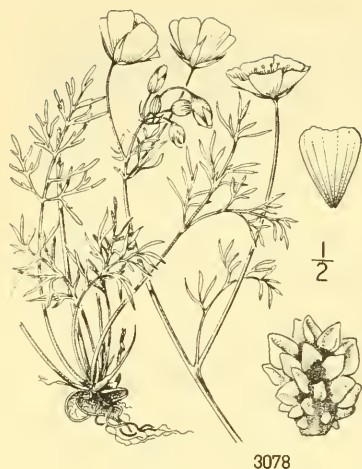
Lithraea laurina Walp. Rep. 1: 551. 1842.

Malosma laurina Nutt. ex Abrams, Fl. Los Ang. ed. 2. 220. 1917.

Shrub or small tree, 2-4 m. high, aromatic, glabrous. Leaves oblong-lanceolate, 7-10 cm. long, acute or obtuse at the apex, rounded at base, mucronate, rather thin-coriaceous; petioles slender, 1-3 cm. long; flowers small, white, in ample, many-flowered, terminal panicles; drupe whitish, 2-3 mm. in diameter, glabrous; mesocarp waxy; stone minute, smooth.

Dry washes and mountain slopes, Upper Sonoran Zone; Santa Barbara County, California, to central Lower California. Type locality: "On bushy plains, near Santa Barbara." May-Aug.

Schinus molle L. Sp. Pl. 388. 1753. Pepper Tree or Peruvian Pepper. Aromatic dioecious evergreen tree, with pendulous branchlets and light brown bark. Leaves pendulous, pinnate; leaflets linear-oblong; flowers small, paniculate; fruit a bright red peppery berry. Native of South America; long planted as an ornamental in California, and occasionally growing spontaneously in the southern part of the state.



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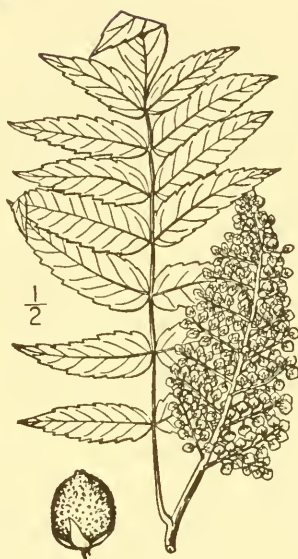
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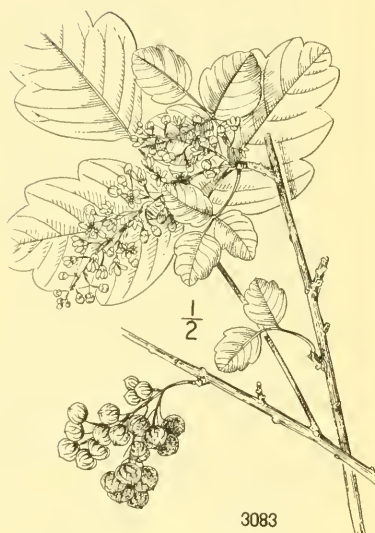
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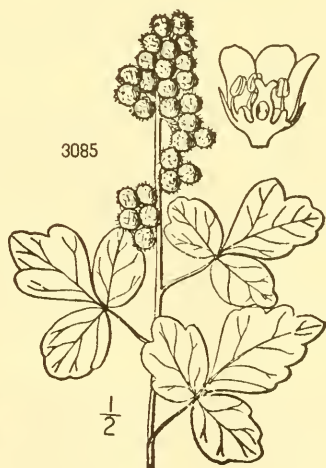
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3078. *Limnanthes rosea*
 3079. *Limnanthes pumila*
 3080. *Limnanthes floccosa*

3081. *Floerkea proserpinacoides*
 3082. *Rhus glabra*
 3083. *Rhus diversiloba*

3084. *Rhus radicans*
 3085. *Rhus trilobata*
 3086. *Rhus integrifolia*



3087

3087. *Rhus ovata*

3088

3088. *Rhus laurina*Family 85. **CELASTRACEAE.**

STAFF-TREE FAMILY.

Trees, shrubs or woody climbers. Leaves alternate or opposite, simple, deciduous or persistent. Stipules small and caducous, or none. Flowers small, regular, usually perfect, borne on commonly jointed pedicels. Calyx-lobes 4 or 5, imbricated, persistent. Petals 4 or 5, spreading. Disk broad, flat or lobed. Stamens usually as many as petals, inserted on the disk. Ovary sessile, its base free from the disk or often adherent, 3-5-celled; style 1, short; stigma entire or 3-5-lobed; ovules 2 in each cell, anatropous. Fruit in ours a 3-5-celled, loculicidal capsule. Seeds usually arilate; embryo large.

A family of about 40 genera and 350 species, widely distributed in temperate and tropical regions.

Stamens 4-5; pistil 2-5-carpellate.

Flowers solitary or clustered in the axils; fruit a 2-5-celled, dehiscent capsule; seeds with an aril.

Leaves (in ours) deciduous; flowers 5-merous; seeds with a red aril.

Leaves evergreen; flowers 4-merous; seeds with a white basal aril.

Flowers in terminal narrow thyrsoid cymes, 5-merous; fruit indehiscent, 1-celled and 1-seeded by abortion;

seed not arillate.

Stamens 8-10; pistil unilocarpellate; fruit a 2-seeded follicle; seed with a small white aril.

1. *Euonymus*.2. *Pachistima*.3. *Mortonia*.4. *Glossopetalon*.1. **EUONYMUS** [Tourn.] L. Sp. Pl. 197. 1753.

Shrubs with opposite, petioled leaves, deciduous or in some exotic species evergreen. Flowers in axillary, few-flowered cymes, greenish or purple. Calyx-lobes 4 or 5, spreading or recurved. Petals 4 or 5. Stamens 4 or 5, inserted on the broad disk. Ovary 3-5-celled, short; stigma 3-5-lobed. Capsule 3-5-celled and 3-5-lobed or rounded. Seeds 1 or 2 in each cell, enveloped by the red aril. [Name Greek, meaning a good name.]

About 60 species, natives of the north temperate regions; mainly in Europe and Asia. Besides the following, 3 other species inhabit the eastern United States. Type species, *Euonymus europaeus* L.

1. **Euonymus occidentalis** Nutt. Western Burning Bush. Fig. 3089.

Euonymus occidentalis Nutt. ex Torr. Pacif. R. Rep. 4: 74. 1856.

Shrub, 2-6 m. high, with slender often scandent branches and smooth, greenish, 4-angled branchlets. Leaves 4-10 cm. long, ovate, acuminate at the apex, serrulate, thin and glabrous, deciduous; petioles 5-15 mm. long; peduncles slender, 25-60 mm. long, 1-5-flowered; petals 5, rounded, 3-4 mm. long, brownish purple, penciled; capsule deeply 3-lobed, depressed, smooth.

Deep moist woods, Transition Zone; Washington, along the Columbia River near Vancouver, to Plumas and Monterey Counties, California. Type locality: Oregon. April-May.

Euonymus occidentalis var. *Parishii* (Trelease) Jepson, Man. Fl. Pl. Calif. 610. 1925. This variety differs only slightly from the typical form. The branchlets are whitish and the cymes are 3-6-flowered. Pine forests, Arid Transition Zone; San Jacinto, Cuyamaca, and Palomar Mountains, southern California. Type locality: San Jacinto Mountains.

2. *PACHÍSTIMA* Raf. Amer. Month. Mag. 2: 176. 1818.

Low glabrous shrub, with corky, 4-angled stems and minute caducous stipules. Leaves opposite, coriaceous, serrulate, evergreen. Flowers solitary or clustered in the axils, perfect, 4-merous. Ovary adherent to the disk, 2-celled; ovules 2 in each cell; style very short; stigma shallowly 2-lobed. Capsule oblong, compressed, 2-celled, loculicidally dehiscent. Seeds with a white, many-lobed aril at the base. [Name Greek, meaning broad stigma.]

A North American genus of 2 species. Besides the following, *P. Canbyi* A. Gray grows in the mountains of Virginia and West Virginia. Type species, *Pachistima Myrsinites* (Pursh) Raf.

In 1838 Rafinesque changed the original spelling *Pachistima* to *Paxistima*, and in 1840 Endlicher changed it to *Pachystima*. All of these are orthographic variants of the original Greek words, *παχυσ*, thick, and *στιγμα*, stigma.

1. *Pachistima Myrsinites* (Pursh) Raf. Mountain Lover or Oregon Boxwood. Fig. 3090.

Ilex? *Myrsinites* Pursh, Fl. Amer. Sept. 1: 119. 1814.

Myginda myrtifolia Nutt. Gen. Pl. 1: 109. 1818.

Paxistima Myrsinites Raf. Sylva Tellur. 42. 1838.

Oreophila myrtifolia Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 259. 1838.

Paxistima myrtifolia L. C. Wheeler, Amer. Midl. Nat. 29: 793. 1943.

Low, much-branched, very leafy shrub, 3–10 dm. high, or sometimes spreading and almost prostrate. Leaves ovate, oblong or oblanceolate, 15–30 mm. long, serrulate, coriaceous, dark glossy green above, somewhat paler beneath, cuneate at base, acute or obtuse at apex, subsessile; peduncles 2–3 mm. long, 1–3-flowered; petals reddish brown, ovate, 1 mm. long; capsule 4–5 mm. long.

Coniferous forests, Transition and Canadian Zones; western British Columbia to Marin County, California, east to Montana and New Mexico. Type locality: Lolo Trail near Hungry (Lolo) Creek, northern Idaho. May–July.

3. *MORTONIA* A. Gray, Smiths. Contr. 3⁵: 34. pl. 4. 1852.

Low intricately branched xerophytic shrubs. Leaves alternate, crowded, evergreen, subsessile, coriaceous, 1-nerved, revolute on the margin, stipules minute, gland-like, caducous. Flowers small, white, in narrow terminal thyrsoid cymes. Calyx-tube obconic, 10-ribbed; lobes 5. Petals 5. Stamen-filaments short. Ovary 5-celled; style columnar; stigmas 5; ovules 2 in each cell, basal, erect. Fruit dry crustaceous, indehiscent, 1-celled and 1-seeded by abortion. Seed oblong, not arillate; embryo erect. [Name in honor of Dr. S. G. Morton, American naturalist of the nineteenth century.]

A genus of 4 or 5 species, natives of the arid southwestern United States and northern Mexico. Type species, *Mortonia sempervirens* A. Gray.

1. *Mortonia utahensis* (Coville) A. Nels. Utah *Mortonia*. Fig. 3091.

Mortonia scabrella var. *utahensis* Coville ex A. Gray, Syn. Fl. N. Amer. 1¹: 400. 1897.

Mortonia utahensis A. Nels. Bot. Gaz. 47: 427. 1909.

Low intricately branched shrub, 8–10 dm. high, the branches pale yellow-green and hispidulous. Leaves broadly oval to suborbicular, 8–12 mm. long, scabrous, thick with a fleshy-thickened margin; thyrses 3–6 cm. long; bracts lanceolate, 3–5 mm. long; calyx-lobes 2 mm. long, hispidulous, scarious on the margins; petals white, obovate, 3 mm. long; fruit oblong, 4 mm. long, glabrous.

Dry desert slopes, Lower Sonoran Zone; Mojave Desert in Inyo and San Bernardino Counties, California, to southern Nevada, northwestern Arizona and Utah. Type locality: southern Utah. March–May.

4. *GLOSSOPÉTALON* A. Gray, Smiths. Contr. 5⁶: 29. pl. 12, B. 1853.

Low rigid and often spinescent shrubs, the slender branches greenish, angled with decurrent lines from the nodes. Leaves deciduous, alternate, small, simple, entire, indistinctly veined, usually with 2–4 lateral veins parallel with the margin; stipules minute, adnate to the enlarged and persistent base of the petiole, or wanting. Flowers small, solitary in the axils or rarely terminal, short-pedicelled. Sepals 4–6, commonly 5, hyaline-margined, ovate, persistent. Petals white, as many as sepals and alternate with them, narrowly oblanceolate or ligulate, inserted under the edge of the fleshy, crenately lobed disk. Stamens 4–10, often unequal, the longer opposite the petals and about equaling them. Pistils of 1–3 distinct ovoid carpels; stigma entire, sessile; ovules 1–2. Fruit an asymmetrical, narrowly ovoid follicle, dehiscing along the ventral suture. Seeds 1 or 2, with a small white aril. [Name Greek, meaning tongue and petal, in reference to the ligulate petals.]

A genus of 7 or 8 closely related species inhabiting the arid regions of western North America. Type species, *Glossopetalon spinescens* A. Gray.

Branches, at least some of them, spinescent; stipules minute, subulate, often adnate to the enlarged persistent bases of the petioles; flowers axillary.

Branches never spinescent; stipules none; flowers terminating short branchlets.

1. *G. nevadense*.

2. *G. pungens*.

1. *Glossopetalon nevadense* A. Gray. Nevada Grease-bush. Fig. 3092.

Glossopetalon nevadense A. Gray, Proc. Amer. Acad. 11: 73. 1876.

Forsellesia nevadensis Greene, Erythraea 1: 206. 1893.

Glossopetalon spinescens var. *aridum* M. E. Jones, Contr. West. Bot. No. 8: 28. 1898.

Forsellesia arida Heller, Cat. N. Amer. Pl. ed. 2. 7. 1900.

Freely or intricately branched shrub, 2-18 dm. high, the branchlets divaricate, green, rather faintly ribbed longitudinally and corrugately roughened transversely, glabrous or puberulent, in age becoming spinescent and yellowish gray. Leaves scattered or somewhat fasciculate, rather narrowly oblanceolate, 5-12 mm. long, tapering at base to a short petiole, rounded to acute or almost acuminate at apex and minutely mucronulate, pale or grayish green; stipules scarious, subulate, less than 1 mm. long, adnate to the thickened base of the petiole; flowers axillary, 4-5-merous; pedicels 3-5 mm. long, with several reduced leaves or scarious bracts; sepals ovate, 1-3 mm. long, entire and hyaline-margined; petals oblanceolate, 4-7 mm. long; stamens 6-10, those opposite the sepals about one-third longer than the others; carpels 1-2; fruit ovoid, 5 mm. long.

Desert mountain ranges, Upper Sonoran and Arid Transition Zones; southern Idaho and Utah to Inyo and San Bernardino Counties, California, and to Arizona. Type locality: "northern part of Washoe County, Nevada." April-June.

Glossopetalon stipulifera St. John, Fl. S.E. Wash. 250. 1937. (*Forsellesia stipulifera* Ensign, Amer. Midl. Nat. 27: 507. 1942.) Closely related to *G. nevadense* and doubtfully specifically distinct, only occasionally or often not at all spinescent; stipules a little larger, slightly over 1 mm. long, broadly subulate or narrowly lanceolate. Arid slopes, Upper Sonoran Zone; canyon of Snake River from southeastern Washington and western Idaho to Malheur County, Oregon; similar plants also along Trinity River, Trinity County, and in the White Mountains, Inyo County, California. Type locality: Snake and Clearwater Rivers near Lewiston, Idaho.

2. *Glossopetalon pungens* Brandg. Low Grease-bush. Fig. 3093.

Glossopetalon pungens Brandg. Bot. Gaz. 27: 445. 1898.

Forsellesia pungens Heller, Cat. N. Amer. Pl. ed. 2. 8. 1900.

Forsellesia pungens var. *glabra* Ensign, Amer. Midl. Nat. 27: 503. 1942.

Low diffusely branched shrub, 0.5-2 dm. high and 3-6 dm. in diameter, older branchlets not becoming spinescent, the young ones very slender, pubescent or glabrous. Leaves crowded, 6-10 mm. long, 2-3 mm. wide, narrowly elliptic, acute at both ends, tipped with a slender spine 1 mm. long, thick especially along the margin and veins, glabrous or scarious; stipules none; flowers terminal on short branchlets; pedicels 3-4 mm. long, with 3-4 small scarious bracts at base; sepals 5, ovate, acuminate, 2 or 3 of them spinose-tipped, denticulate and hyaline-margined; petals 5, oblanceolate, 6-8 mm. long; stamens 10; carpels 1-3, sparingly puberulent.

Rocky slopes, Sonoran Zones; Sheep Mountains at elevations of 4,000-5,000 feet, Clark County, Nevada, and Clark Mountains, eastern San Bernardino County, California. The Sheep Mountains plants are the typical species with puberulent twigs and leaves. The Clark Mountains plants are glabrous and represent the variety described by Miss Ensign. Type locality: Sheep Mountains, Nevada. May-June.

Canotia holacantha Torr. Pacif. R. Rep. 4: 68. 1856. *Canotia*. Shrub or small tree, the branches broom-like, green, glabrous and spine-tipped. Leaves wanting, reduced to small triangular scales; flowers 5-merous; petals greenish white, about 4 mm. long; ovary 5-celled; style simple; seed solitary in each cell, winged. A curious desert shrub belonging to the family *Koeberliniaceae* growing on the mountains of western Arizona. Reported collected in the Providence Mountains, California, by Cooper in 1860-62 but not rediscovered there since.

Family 86. STAPHYLEACEAE.

BLADDER-NUT FAMILY.

Trees or shrubs, with opposite, odd-pinnate or 3-foliate leaves. Stipules small, early deciduous. Flowers regular, perfect, usually 5-merous, in terminal or axillary clusters. Stamens inserted outside at the base of the large disk. Pistil free from the disk; ovary commonly 3-celled. Fruit a 3-lobed bladdery capsule dehiscent at the apex, or in some genera an indehiscent capsule.

A family of 5 genera and about 22 species, natives of the north temperate regions.

1. STAPHYLÈA L. Sp. Pl. 270. 1753.

Shrubs or rarely small trees. Leaves 3-foliate or pinnate, deciduous. Flowers white, on jointed pedicels in drooping axillary panicles. Petals about as long as the calyx-lobes, erect. Pistil of 3 carpels, united only by their axes; styles 3; ovules many in each cell. Fruit a bladdery, deeply 3-lobed capsule, dehiscent at the apex. Seeds globose. [Name Greek, meaning a cluster.]

A genus of about 6 species, natives of the north temperate regions. Type species, *Staphylea pinnata* L. Besides the following, *S. trifolia* L. occurs in Canada and the northeastern United States.

1. *Staphylea Bolanderi* A. Gray. Bolander's or California Bladder-nut. Fig. 3094.

Staphylea Bolanderi A. Gray, Proc. Amer. Acad. 10: 69. 1874.

An arborescent shrub or small tree, 2-6 m. high, glabrous throughout. Leaves 3-foliate;

leaflets 3-6 cm. long, broadly ovate, acutish, serrulate; petals 6-8 mm. long, a little longer than the striate calyx-lobes; capsule 3-5 cm. long, the carpels separating at the summit and somewhat spreading, dehiscent down the inner side of the free portion.

Occasional in foothill canyons, Upper Sonoran Zone; western slopes of the Sierra Nevada from Siskiyou County to Tulare County, California. Type locality: "Banks of St. Cloud [McCloud] River," Shasta County, California. April-May.

Family 87. ACERACEAE.

MAPLE FAMILY.

Trees or shrubs, with watery, often saccharine sap, and opposite, simple and palmately lobed, or pinnate leaves. Flowers polygamous or dioecious, regular, in terminal or axillary corymbs or racemes. Calyx generally 5-parted, the lobes imbricated. Petals of the same number as the calyx-lobes or none. Disk thick, annular, lobed, sometimes obsolete. Stamens 4-12, often 8; filaments filiform. Ovary superior, 2-celled, 2-lobed; styles 2, inserted between the lobes. Fruit of 2 long-winged samaras, joined at the base, but usually separating before falling. Seeds 1 or sometimes 2 in a samara, compressed, ascending; endosperm none; cotyledons thin, folded.

A family of 2 genera and about 125 species, natives of the northern hemisphere. The second genus, *Dipteronia*, of central Asia, differs from *Acer* in having the samara winged all around.

1. *ACER* L. Sp. Pl. 1055. 1753.

Characters of the family. [The Latin name for the genus.]

A genus of about 120 species, natives of the north temperate regions. Type species, *Acer Pseudo-Platanus* L.

Leaves simple, palmately lobed; flowers polygamous; petals present.

Flowers in many-flowered racemes; body of the samara hispid.

1. *A. macrophyllum*.

Flowers in few-flowered corymbs; samaras glabrous.

Leaves 3-5-lobed; samaras slightly spreading, the angle about 45 degrees.

2. *A. glabrum Douglasii*.

Leaves 7-9-lobed; samaras widely spreading, the angle nearly 180 degrees.

3. *A. circinatum*.

Leaves pinnate, with 3-5 leaflets; flowers dioecious; petals none; body of samara finely pubescent.

4. *A. Negundo californicum*.

1. *Acer macrophyllum* Pursh. Big-leaved or Oregon Maple. Fig. 3095.

Acer macrophyllum Pursh, Fl. Amer. Sept. 1: 267. 1814.

Tall round-topped trees attaining a maximum height of about 30 m., the bark on old trunks thick and furrowed. Leaves large, 10-25 cm. broad, deeply 3-5-parted, the lobes irregular, coarsely toothed, soft pubescent when young, becoming glabrate above and puberulent beneath in age; flowers polygamous, perfect and staminate flowers mixed in the same raceme; sepals and petals rather broad, about equal in length; filaments pubescent at the base; body of the samara with stiff tawny hairs, wings 2-4 cm. long, diverging at an acute angle.

Stream banks, mainly Transition Zone; southern Alaska southward, west of the Cascade Mountains and Sierra Nevada to southern California. Type locality: Cascades of the Columbia River. April-May.

Greene (Leaflets Bot. Obs. 2: 248-254. 1912.) has proposed several segregates, relying largely on the lobing of the leaf for differentiating the species.

2. *Acer glabrum* subsp. *Douglasii* (Hook.) Wesml. Dwarf or Mountain Maple. Fig. 3096.

Acer Douglasii Hook. Lond. Journ. Bot. 6: 77. pl. 6. 1846.

Acer glabrum subsp. *Douglasii* Wesml. Bull. Bot. Soc. Belg. 29: 46. 1890.

Acer glabrum var. *Douglasii* Dippel, Handb. Laubh. 2: 438. 1892.

Small tree, 3-10 m. high, with smooth gray bark. Leaves simple, orbicular in outline, 5-lobed, the lobes acute, coarsely and sharply serrate, the terminal tooth acuminate, truncate or subcordate at base, 5-10 cm. long, glabrous, dark green above, paler beneath; petioles slender; flowers in small, few-flowered corymbs, polygamous; sepals and petals similar, spatulate-oblong, about 4 mm. long; samaras diverging at an angle less than 45 degrees, glabrous, the wings about 2 cm. long.

Stream banks and edges of meadows, Canadian Zone; Alaska to the Cascade Mountains, northern Oregon, east to western Montana. Type locality: "Blue Mountains of Oregon." April-May.

Typical *Acer glabrum* Torr. inhabits the Rocky Mountains region, and is somewhat intermediate between the subspecies *Douglasii* and *Torreyi*.

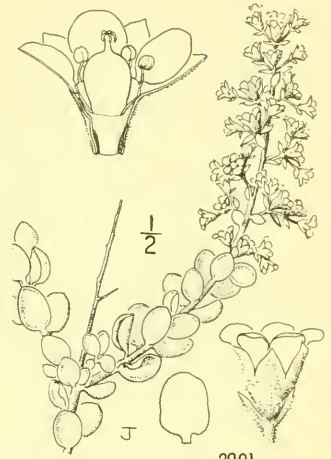
Acer glabrum var. *Torreyi* (Greene) Smiley, Univ. Calif. Pub. Bot. 9: 261. 1921. (*Acer Torreyi* Greene, Pittonia 5: 2. 1902.) Low tree or usually shrubby. Leaves 2.5-4 cm. long, usually broader than long, mostly 3-lobed, or obscurely 5-lobed, the lobes acutish, serrate with acutish teeth, base of the blade subcordate. Mountain meadows and streams, Canadian Zone; Sierra Nevada, California. Intermediate forms between this and the



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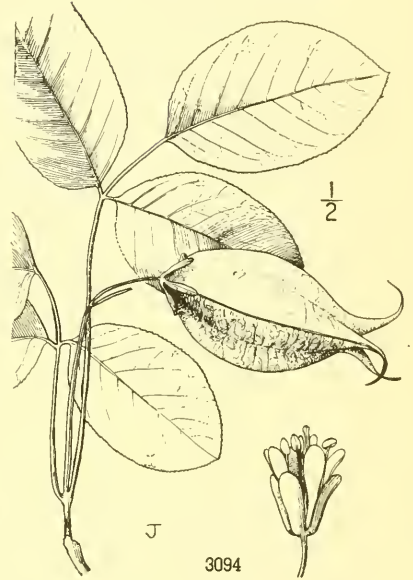
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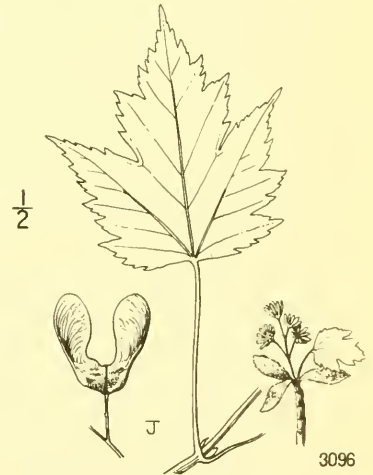
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3089. *Euonymus occidentalis*
3090. *Pachistima Myrsinites*
3091. *Mortonia utahensis*

3092. *Glossopetalon nevadense*
3093. *Glossopetalon pungens*
3094. *Staphylea Bolanderi*

3095. *Acer macrophyllum*
3096. *Acer glabrum*

typical species are found in southern Oregon and in the Siskiyou Mountains, California. Type locality: "Californian Sierra at middle altitudes."

Acer glabrum var. *diffusum* (Greene) Smiley, loc. cit. (*Acer diffusum* Greene, *Pittonia* 5: 2. 1902; *Acer bernardinum* Abrams, *Torreya* 7: 219. 1907.) Low diffusely branched shrub, with nearly white bark. Leaves often trifoliate, 1–2.5 cm. long, teeth often obtuse or subcrenate; samara-wing 10–12 mm. long. Alpine stream banks and rocky slopes, Boreal Zones; western Nevada, southern Sierra Nevada, San Bernardino and San Jacinto Mountains, California. Type locality: west Humboldt Mountains, Nevada.

3. *Acer circinatum* Pursh. Vine Maple. Fig. 3097.

Acer circinatum Pursh, *Fl. Amer.* Sept. 1: 267. 1814.

Acer modocense Greene, *Pittonia* 5: 4. 1902.

An erect shrub or small tree attaining a height of 10–15 m. but more often reclining or vine-like. Leaves short-petioled, 7–12 cm. broad, round-cordate in outline, with a broad and usually shallow sinus, 7–9-lobed, the lobes acuminate and sharply serrate, villous when young, glabrate in age except for a tuft of hairs near the base beneath; corymbs terminal on slender 2-leaved branchlets, 5–20-flowered; calyx-lobes 4–6 mm. long, villous, reddish purple; petals much shorter than the calyx-lobes, greenish white; stamens 8, the filaments villous below; samaras 2–3 cm. long, widely diverging to form an angle of 180 degrees, scarlet when ripe.

Stream banks and moist woods, Humid Transition Zone; west of the Cascade Mountains from British Columbia to Mendocino and Butte Counties, California. Type locality: Cascades of the Columbia River. April–May.

4. *Acer Negundo* subsp. *californicum* (Torr. & Gray) Wesml. California Box Elder. Fig. 3098.

Negundo californicum Torr. & Gray, *Fl. N. Amer.* 1: 250. 1838.

Acer californicum D. Dietr. *Syn. Pl.* 2: 1283. 1840.

Acer Negundo subsp. *californicum* Wesml. *Bull. Bot. Soc. Belg.* 29: 43. 1890.

Acer Negundo var. *californicum* Sargent, *Garden & Forest* 4: 148. 1891.

Round-topped tree, 6–20 m. high, the branchlets and foliage pubescent, densely so when young. Leaves 3-foliate, the terminal leaflet larger than the lateral, 3–5-lobed, or coarsely serrate, rather long-petiolulate, the lateral ones oblong, coarsely serrate or somewhat lobed on the lower edge, short-petiolulate; staminate flowers borne on elongated, filiform, villous pedicels; calyx minute; stamens 4 or 5; pistillate flowers borne in slender drooping racemes; samaras red when young, becoming straw-colored when mature, about 3 cm. long, finely pubescent.

Stream banks and moist bottom lands, mainly Upper Sonoran Zone; foothills and valleys from Shasta County to San Bernardino County, California. Type locality: California. Collected by Douglas. March–April.

Family 88. AESCULACEAE.

BUCKEYE FAMILY.

Trees or shrubs with deciduous, palmately compound leaves. Flowers polygamous, showy, borne on jointed pedicels in a terminal thyrse or panicle, the perfect flowers few near the top of the inflorescence, the staminate numerous. Calyx tubular or campanulate, 5-parted, the lobes unequal. Petals 4 or 5, unequal, clawed. Disk entire, often 1-sided. Stamens 5–8. Ovary 3-celled; ovules 2 in each cell; style slender. Fruit a leathery, globose or slightly 3-lobed capsule, smooth or spiny; 3-celled or by abortion 1-celled and 1-seeded. Seeds large, shining; endosperm none; cotyledons large and thick.

A family of 3 genera and about 18 species, natives of the northern hemisphere.

1. *AESCULUS* L. Sp. Pl. 344. 1753.

Characters of the family. [The ancient Latin name.]

A genus of about 15 species, natives of North and Central America and Asia. Type species, *Aesculus Hippocastanum* L.

1. *Aesculus californica* (Spach) Nutt. California Buckeye. Fig. 3099.

Calothyrsus californica Spach, *Hist. Veg.* 3: 35. 1834.

Aesculus californica Nutt. in Torr. & Gray, *Fl. N. Amer.* 1: 251. 1838.

Tree 4–7 m. high, with a broad round top. Leaflets 5–7, oblong-lanceolate, serrulate, 6–15 cm. long, petiolulate, glabrous; thyrse erect, 10–20 cm. long, finely pubescent; calyx 2-lobed, the lobes shallowly toothed; petals white or pale rose, about 15 mm. long; stamens 5–7; anthers orange; fruit smooth, pear-shaped, 1- or rarely 2-seeded, often solitary on the drooping naked rachis of the thyrse; seed 2–3 cm. in diameter, glossy brown, with a large whitish hilum.

Hillsides and canyons, especially on north slopes, Upper Sonoran Zone; Coast Ranges and the Sierra Nevada foothills, from Siskiyou County to the Sierra Liebre, Los Angeles County, California. Type locality: California. Collected by Dr. Botta. May.

Family 89. BALSAMINACEAE.

JEWEL-WEED FAMILY.

Succulent herbaceous plants, with alternate simple leaves and showy irregular flowers, or the later flowers small, cleistogamous and apetalous. Sepals 3, the two lateral ones small and green, the posterior one large, petaloid, saccate and spurred. Petals 5, or usually 3, with two of them 2-cleft into unequal lobes. Stamens 5, short; filaments with scale-like appendages on the inner side and more or less united; anthers connivent or coherent. Ovary oblong, 5-celled; style very short or obsolete; stigma 5-lobed; ovules several in each cell. Fruit a slender capsule, elastically dehiscent into 5 coiled valves, expelling the oblong seeds; endosperm none; embryo straight, with flat cotyledons.

A family of 2 genera and about 220 species, mostly natives of tropical Asia. The monotypic genus *Hydrocera* differs from *Impatiens* in having a 4-5-celled indehiscent berry.

1. *IMPATIENS* [Rivin.] L. Sp. Pl. 937. 1753.

Our species annuals with 3 petals, each of the posterior ones being united with the adjoining lateral one to form an unequally 2-cleft petal. Capsule narrow, 5-celled. [Name Latin, in allusion to the elastically dehiscent capsule.]

About 220 species, mostly natives of tropical Asia. Seven or eight species occur in North and Central America. Type species, *Impatiens Noli-tangere* L.

Posterior sepal spurred, the spur more or less strongly incurved.

Flowers orange-yellow; sack about 12 mm. long.

Flowers pale yellow; sack about 20 mm. long.

Posterior sepal not spurred.

1. *I. aurella*.

2. *I. occidentalis*.

3. *I. ecalcarata*.

1. *Impatiens aurella* Rydb. Pale-yellow Touch-me-not. Fig. 3100.

Impatiens aurella Rydb. Bull. Torrey Club 28: 34. 1900.

Stems 5-6 dm. high, slender, light green, branching above. Leaves 2-8 cm. long, ovate to oval, coarsely serrate-dentate, thin, bright green above, paler beneath; petioles 5-40 mm. long; pedicels very slender; lateral sepals ovate, 4-5 mm. long; posterior sepal conical, 10-15 mm. long, orange, unspotted; spur strongly incurved, about 8 mm. long; petals 3, the anterior one triangular-obovate, emarginate, 5 mm. long, 8 mm. wide; capsule oblong-linear, 15-20 mm. long.

Moist ground, Upper Sonoran and Transition Zones; eastern Washington and British Columbia to Idaho and Montana. Type locality: Priest River, Idaho. Aug.-Sept.

Closely related to *Impatiens biflora* Walt. of the eastern United States, which has larger spotted flowers.

2. *Impatiens occidentalis* Rydb. Western Jewel-weed. Fig. 3101.

Impatiens occidentalis Rydb. N. Amer. Fl. 25: 94. 1910.

Stems light green, about 1 m. high, branching above. Leaves oval, 2-10 cm. long, thin light green, serrate-dentate; inflorescence 3-5-flowered; pedicels very slender; lateral sepals obovate, abruptly acuminate, 6 mm. long; posterior sepal conical, about 2 cm. long, pale yellow, unspotted or minutely dotted, its spur strongly incurved; anterior petal pale yellow, broadly obovate, about 7 mm. long and 10 mm. wide; capsule linear-clavate, 15-20 mm. long.

Wet places, Humid Transition and Canadian Zones; Alaska to western Washington. Type locality: along streams in damp woods, North Fork of Nooksack River, Washington. July-Sept.

This species has been referred to the Eurasian species *Impatiens Noli-tangere* L. and was formerly considered as introduced on the Pacific Coast.

3. *Impatiens ecalcarata* Blankinship. Spurless Jewel-weed. Fig. 3102.

Impatiens ecalcarata Blankinship, Mont. Agr. Coll. Sci. Stud. 1: 85. 1905.

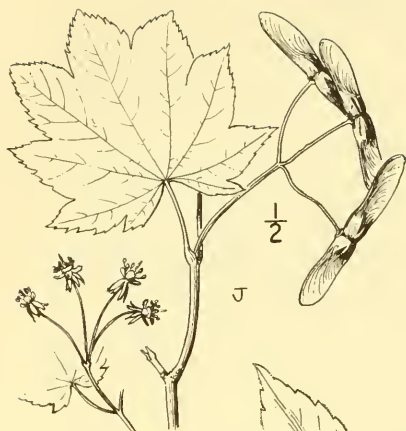
Stems slender, light green, about 1 m. high. Leaves ovate to ovate-elliptic, 2-10 cm. long, obliquely dentate; inflorescence 2-6-flowered; lateral sepals obliquely oval, 6 mm. long; posterior sepal helmet-shaped, unspurred, 8-10 mm. long, and a little wider, pale yellow, unspotted; petals pale yellow.

Wet shady places, Canadian and Transition Zones; southeastern British Columbia to Montana and Oregon. In the Pacific States it has been collected in the Columbia Valley (*Lyall*) and at Ilwaco, Washington, and Clatskanie, Oregon. Type locality: damp shady margin of a stream, Missoula County, Montana. Aug.-Sept.

Family 90. RHAMNACEAE.

BUCKTHORN FAMILY.

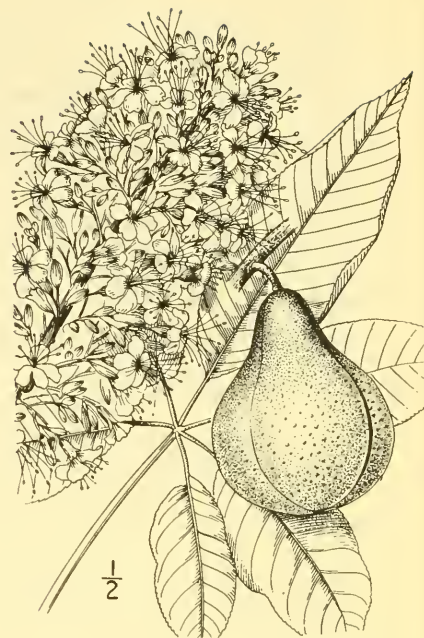
Small trees, shrubs, or a few climbers, often thorny, with simple generally alternate leaves. Stipules present, small and deciduous or sometimes corky and persistent. Flowers small, regular, perfect or polygamous, usually in axillary or ter-



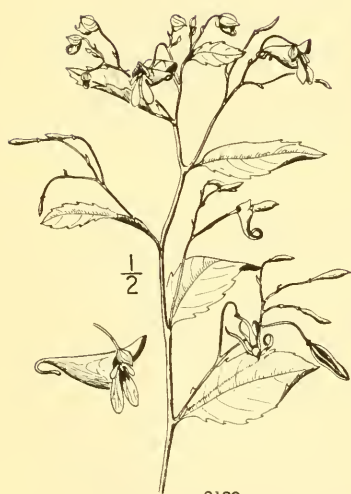
3097



3098



3099



3100



3101



3102

3097. *Acer circinatum*
3098. *Acer Negundo*

3099. *Aesculus californica*
3100. *Impatiens aurea*

3101. *Impatiens occidentalis*
3102. *Impatiens ecalcarata*

minal cymes or panicles. Calyx 4-5-toothed. Petals 4-5, inserted on the calyx, sometimes wanting. Stamens 4-5, opposite the petals; anthers short, versatile. Disk fleshy. Ovary sessile, free from or immersed in the disk, 2-5-celled. Ovules solitary in each cell, anatropous, ascending. Fruit a drupe, berry or capsule, often 3-celled. Seeds with fleshy or rarely no endosperm; embryo large; cotyledons flat.

A family of about 50 genera and 600 species, inhabiting the temperate and tropical regions.

Fruit drupe-like; flowers 4-5-merous; petals sometimes absent.

Nutlets 1 to each drupe; petals when present clawed.

1. *Condalia*.

Nutlets 2-3 to each berry-like drupe; petals when present sessile or very short-clawed.

2. *Rhamnus*.

Fruit a 3-celled capsule; petals distinctly clawed.

Calyx-tube adherent to the lower part of the capsule; calyx-lobes deciduous.

Pedicels and calyx glabrous; calyx-lobes petaloid.

3. *Ceanothus*.

Pedicels and calyx tomentose; calyx-lobes not petaloid.

4. *Colubrina*.

Calyx-tube investing the lower part of the capsule but not adherent, the lobes persistent.

5. *Adolphia*.

1. *CONDALIA* Cav. Anal. Ci. Nat. Madrid 1: 39. pl. 4. 1799.

Small trees or shrubs with divaricate branches and often spiny twigs. Leaves alternate, entire, with minute stipules. Flowers in sessile or short-peduncled axillary cymes. Calyx deeply lobed. Petals when present clawed and hooded. Styles 2-3-notched or shallowly lobed. Ovary free from the calyx and disk, incompletely 2-celled. Fruit a drupe with a single nutlet. [Name in honor of Antonio Condal, a Spanish physician.]

A genus of about 10 species, inhabiting the warm temperate and tropical regions of America. Type species, *Condalia microphylla* Cav.

Petals none; calyx-lobes persistent.

1. *C. globosa pubescens*.

Petals present; calyx-lobes deciduous.

Drupe beakless, 6-10 mm. long; plants canescent.

2. *C. lycioides canescens*.

Drupe beaked, 15 mm. long; plants glabrous.

3. *C. Parryi*.

1. *Condalia globosa* var. *pubescens* I. M. Johnston. Spiny Abrojo or Crucillo. Fig. 3103.

Condalia globosa var. *pubescens* I. M. Johnston, Proc. Calif. Acad. IV. 12: 1087. 1924.

Intricately branching shrub with short divaricate spiny twigs, minutely puberulent and brownish-pruinose. Leaves narrowly spatulate to oblanceolate, 7-13 mm. long, 2-5 mm. wide, becoming reduced to minute scales toward the spinescent tips, minutely puberulent or glabrate, thick, with a few low broad veins; sepals deciduous; drupe obliquely ovoid, 4-5 mm. long, black and juicy; pedicels about as long as or longer than the fruit.

Desert slopes, Lower Sonoran Zone; Colorado Desert, at Mesquite Station and Picacho, southern California, east to western Arizona and south to northern Lower California. Type locality: San Esteban Island, Gulf of California, Lower California. March-May.

2. *Condalia lycioides* var. *canescens* (A. Gray) Trelease. Gray Abrojo or Crucillo. Fig. 3104.

Zizyphus lycioides var. *canescens* A. Gray, Wheeler Rep. 6: 82. 1878.

Condalia lycioides var. *canescens* Trelease in A. Gray, Syn. Fl. N. Amer. 11: 403. 1897.

Condalia divaricata A. Nels. Bot. Gaz. 47: 427. 1909.

Much-branched shrub, with pale gray-green bark, the ultimate branches divaricate, rigid and spinescent, more or less canescent. Leaves oblong or oblong-elliptic, 5-15 mm. long, entire or denticulate, more or less canescent, rather thin, finely net-veined; flowers in short-peduncled umbels; drupe ellipsoid, 6-10 mm. long.

Usually in bottom lands, Lower Sonoran Zone; Colorado Desert, California, east to southern Nevada and western Arizona, and south to Sonora and Lower California. Type locality: valley of the Gila River, Arizona. April-July. Lotebush.

3. *Condalia Parryi* (Torr.) Weberb. California Abrojo or Crucillo. Fig. 3105.

Zizyphus Parryi Torr. Bot. Mex. Bound. 46. 1859.

Condalia Parryi Weberb. in Engl. & Prantl, Nat. Pflanzenf. 35: 404. 1896.

Arborescent glabrous shrub with the ultimate branches divaricate and spinescent. Leaves fascicled on short spurs, elliptic-obovate, 8-20 mm. long, entire, glabrous and bright green on both surfaces; petiole slender, 2-5 mm. long; flowers in small cymose clusters on short spurs; pedicels very slender, 8-10 mm. long; drupe broadly ellipsoid, 1-2 cm. long, usually distinctly beaked, the pericarp dry and thin.

Desert slopes, Lower Sonoran Zone; western edge of the Colorado Desert, San Bernardino County, California, south to northern Lower California. Type locality: San Felipe Canyon, California. Feb.-April.

2. *RHAMNUS* [Tourn.] L. Sp. Pl. 193. 1753.

Shrubs or small trees with alternate pinnately veined deciduous or evergreen leaves.

Flowers small, perfect, dioecious or polygamous, in small axillary cymes, racemes or panicles. Calyx 4-5-toothed, the tube urceolate. Petals when present very short-clawed, often emarginate and somewhat hooded. Ovary 2-4-celled, free from the disk. Style 2-4-lobed. Fruit a berry-like drupe, with 2-4 separate nutlets. [The ancient Greek name.]

A genus of about 90 species, natives of the temperate and tropical regions. Type species, *Rhamnus cathartica* L.

Petals present; bud-scales none.

Leaves deciduous, rather thin and not coriaceous.

Fruit 3-seeded; leaves 6-15 cm. long.

Fruit 2-seeded; leaves 3-7 cm. long.

Leaves evergreen, rather thick and coriaceous.

Petals none; bud-scales present.

Leaves deciduous; berries black.

Leaves evergreen; berries red.

1. *R. Purshiana*.

2. *R. rubra*.

3. *R. californica*.

4. *R. alnifolia*.

5. *R. crocea*.

1. *Rhamnus Purshiana* DC. Cascara Sagrada. Fig. 3106.

Rhamnus Purshiana DC. Prod. 2: 25. 1825.

Frangula Purshiana Cooper, Pacif. R. Rep. 12: 29, 57. 1860.

Rhamnus anonaefolia Greene, Pittonia 3: 16. 1896.

Small tree or arborescent shrub, 3-10 m. high with smooth grayish bark, the young twigs pubescent. Leaves deciduous, elliptic-oblong, 8-20 cm. long, obtuse or rounded at apex, obtuse to subcordate at base, serrulate, glabrous or nearly so; petioles finely tomentose; flowers perfect, 5-merous, in small pedunculate umbels, 3-4 mm. wide; petals somewhat truncate at base above the short claw; berries black, with 3 nutlets, or rarely with only 2.

Moist soils in lowlands and canyons, Humid Transition Zone; British Columbia southward on the Pacific Slope to Mendocino and Placer Counties, California, east to northern Idaho and western Montana. Type locality: Clearwater River near Kamiah, Idaho. June-July.

2. *Rhamnus rubra* Greene. Sierra Coffeeberry. Fig. 3107.

Rhamnus rubra Greene, Pittonia 1: 68. 1887.

Rhamnus californica var. *rubra* Trelease, Trans. St. Louis Acad. 5: 367. 1889.

Spreading or rounded shrub, 1-2 m. high, the bark gray or often reddish, young twigs pubescent or glabrate. Leaves deciduous, rather thin, narrowly elliptic, oblong or obovate, 2-8 cm. commonly about 4 cm. long, finely serrulate to denticulate, glabrous or somewhat pubescent on both surfaces; flowers perfect, 5-merous, in small peduncled umbels; petals with a broad notch at apex, abruptly obtuse or truncate at base, the claw short but evident; berry black; nutlets 2 or sometimes 3.

Mountain slopes, Arid Transition and Canadian Zones; Mount Shasta region south to the southern Sierra Nevada, California, and adjacent Nevada. Type locality: eastern base of the Sierra Nevada, near Truckee, California. June-July.

Rhamnus rubra subsp. *nevadensis* (A. Nels.) C. B. Wolf, Mon. Rancho Santa Ana Bot. Gard. Bot. Ser. 1: 86. 1938. (*Rhamnus nevadensis* A. Nels. Proc. Biol. Soc. Wash. 18: 174. 1905.) This subspecies resembles the typical species in the acute leaves, but the mature berries are pyriform and usually over 10 mm. in diameter, whereas in the typical species the berries are obovoid or spherical and usually less than 10 mm. in diameter. Along the eastern border of California and adjacent Ormsby and Douglas Counties, Nevada. Type locality: near Reno, Nevada.

Rhamnus rubra subsp. *obtusissima* (Greene) C. B. Wolf, op. cit. 88. (*Rhamnus obtusissima* Greene, Leaflets Bot. Obs. 1: 64. 1904.) Distinguished from the typical species by the very obtuse leaves. Sierra Nevada from Siskiyou County to Tuolumne County, California, and adjacent Nevada. Type locality: Sisson, California.

Rhamnus rubra subsp. *modocensis* C. B. Wolf, op. cit. 89. fig. 35. Leaves small, fascicled on short stubby spurs, characters that distinguish it from the typical species and the other subspecies. Northeastern California in Siskiyou and Modoc Counties. Type locality: Dry Lake, Modoc County.

Rhamnus rubra subsp. *yosemitana* C. B. Wolf, op. cit. 90. figs. 36, 37. Both surfaces of the leaves with a fine soft puberulence. In the typical species and the other subspecies the leaves are glabrous or minutely puberulent on the midrib. Western slopes of the central Sierra Nevada, California. Type locality: Yosemite Valley, Yosemite National Park.

3. *Rhamnus californica* Esch. California Coffeeberry. Fig. 3108.

Rhamnus californica Esch. Mém. Acad. St. Pétersb. 10: 285. 1823.

Rhamnus oleifolia Hook. Fl. Bor. Amer. 1: 123. pl. 44. 1833.

Rhamnus laurifolia Nutt. in Torr. & Gray, Fl. N. Amer. 1: 260. 1848.

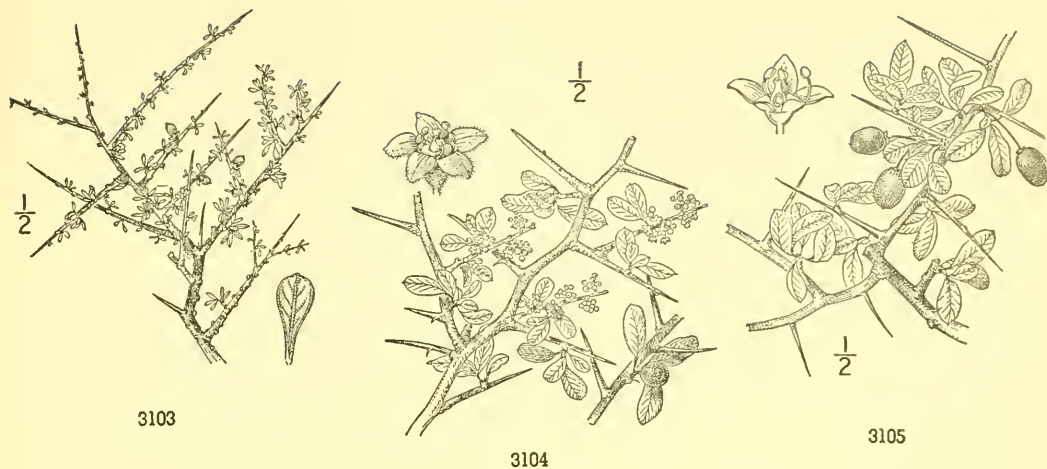
Frangula californica A. Gray, Gen. III. 2: 178. 1849.

Rhamnus Purshiana var. *californica* Rehder in Bailey, Cyclop. Hort. 1510. 1902.

Arborescent shrub with a rounded crown, or low and spreading, the young twigs reddish brown and sparsely puberulent. Leaves oblong to elliptic, 3-8 cm. long, acute or obtuse, the margins finely denticulate or entire, plane or slightly revolute, dark green above, bright shining green beneath and glabrous or slightly pubescent on the veins; flowers perfect, 5-merous, or sometimes 4-merous, in pedunculate umbels; petals when spread out about 2 mm. broad, broadly notched at apex, usually acute at base; berry spherical, 10-12 mm. in diameter, black when fully mature; nutlets 2 or sometimes 3, resembling coffee.

Hillsides and ravines, Transition and Upper Sonoran Zones; California Coast Ranges from western Siskiyou County to San Bernardino County, California. Type locality: San Francisco, California. May-June.

Rhamnus californica subsp. *occidentalis* (Howell) C. B. Wolf, Mon. Rancho Santa Ana Bot. Gard. Bot.

3103. *Condalia globosa*3104. *Condalia lycioides*3105. *Condalia Parryi*

Ser. 1: 66. 1938. (*Rhamnus occidentalis* Howell, Pittonia 2: 15. 1899.) Low shrub, bark of the young twigs green. Leaves firm, coriaceous, glabrous, rather bright green above, yellow-green beneath; fruit 3-seeded. Canyon slopes, Transition and Canadian Zones; Siskiyou Mountains of southwestern Oregon and northwestern California. Type locality: Waldo, Josephine County, Oregon.

Rhamnus californica subsp. *crassifolia* (Jepson) C. B. Wolf, op. cit. 68. (*Rhamnus californica* var. *crassifolia* Jepson, Man. Fl. Pl. Calif. 615. 1925.) Leaves broadly elliptical, entire, densely white-tomentulose on both surfaces. Inner North Coast Ranges, California. Type locality: western Colusa County.

Rhamnus californica subsp. *tomentella* (Benth.) C. B. Wolf, op. cit. 70. (*Rhamnus tomentella* Benth. Pl. Hartw. 303. 1848.) Arborescent shrub, leaves oblong or narrowly elliptic, entire, glabrous or pubescent above, densely white-tomentulose beneath, the margins slightly revolute. Foothills of the Sierra Nevada and the Coast Ranges, California, south to northern Lower California. Type locality: "Montibus Sacramento." Collected by Hartweg.

Rhamnus californica subsp. *cuspidata* (Greene) C. B. Wolf, op. cit. 72. (*Rhamnus cuspidata* Greene, Leaflets Bot. Obs. 1: 64. 1904.) Resembling the subspecies *tomentella*, but the leaves sharply denticulate. Foothills of the southern Sierra Nevada and Inyo County south to the desert slopes of the San Bernardino Mountains, California. Type locality: Tehachapi, Kern County.

4. *Rhamnus alnifolia* L'Hér. Alder-leaved Coffeeberry. Fig. 3109.

Rhamnus alnifolia L'Hér. Sert. Angl. 5. 1788.

Apetlorhamnus alnifolia Nieuwl. Amer. Midl. Nat. 4: 89. 1915.

Shrub, 1–3 m. high, with gray bark, the twigs puberulent or glabrate, bud-scales present. Leaves deciduous, oval to elliptic, 4–10 cm. long, usually abruptly acuminate, sometimes obtuse or even rounded at apex, crenate-serrate, rather thin, puberulent or glabrous on both surfaces; flowers appearing with the leaves, 1–3 in the axils; unisexual, 5-merous or sometimes 4-merous; petals none; berry black, 6–8 mm. in diameter, with 3 nutlets.

Usually in swamps and bogs, mainly Canadian Zone; Saskatchewan to Quebec south to California, Indiana, and Pennsylvania. In the Pacific States occurring east of the Cascade Mountains and Sierra Nevada, from northeastern Washington to central California. Type locality: "America septentrionali." May–June.

5. *Rhamnus crocea* Nutt. Red-berried Buckthorn or Redberry. Fig. 3110.

Rhamnus crocea Nutt. in Torr. & Gray, Fl. N. Amer. 1: 261. 1838.

Low much-branched shrub, seldom over 1–2 m. high, the branchlets rigid and often spinescent. Leaves evergreen, rigidly coriaceous, 10–15 mm. long, elliptic to broadly ovate or obovate, usually glandular-serrulate, glabrous or slightly puberulent on the petiole and midrib; flowers unisexual, 4-merous or sometimes 5-merous; petals none; berry red, sweet, obovoid, 5–8 mm. long; nutlets 2.

Chaparral-covered hills and ravines, Upper Sonoran Zone; Coast Ranges from central California to northern Lower California. Type locality: Monterey, California. April–May.

Rhamnus crocea subsp. *ilicifolia* (Kell.) C. B. Wolf, Mon. Rancho Santa Ana Bot. Gard. Bot. Ser. 1: 39. 1938. (*Rhamnus ilicifolia* Kell. Proc. Calif. Acad. 2: 37. 1863.) Shrub or small tree, the twigs glabrous or nearly so, not spinescent. Leaves as in the typical species, but larger, 15–40 mm. long, broadly ovate-elliptic to orbicular, green or brownish beneath. Siskiyou County south through the Coast Ranges and the foothills of the Sierra Nevada to San Diego County, California. In northern and central California the leaves are commonly brownish beneath, but in the southern Sierra Nevada and south of Santa Barbara they are usually green. Type locality: vicinity of Clear Lake, Lake County.

Rhamnus crocea subsp. *pilosa* (Trelease) C. B. Wolf, op. cit. 38. (*Rhamnus crocea* var. *pilosa* Trelase

ex Curran, Proc. Calif. Acad. II. 1: 251. 1888.) This is distinguished from the green-leaved form of the subspecies *ilicifolia* by the pilose or densely grayish-puberulent twigs and petioles. It occurs on the western slopes of the mountains in San Diego County, extends eastward to the desert slopes of southern California and Arizona and south to northern Lower California. Type locality: Santa Maria Valley, San Diego County, California.

Rhamnus crocea subsp. *pirifolia* (Greene) C. B. Wolf, op. cit. 45. (*Rhamnus pirifolia* Greene, Pittonia 3: 15. 1896.) Closely related to the subspecies *ilicifolia* from which it differs chiefly in being more arboreal and having larger leaves, which are less sharply toothed. It has been confused with *Rhamnus insulus* Kell. of Cedros Island, Lower California. Santa Rosa, Santa Cruz, Santa Catalina, and San Clemente Islands, California, and Guadalupe Island, Lower California. Type locality: Santa Cruz Island.

3. CEANOTHUS L. Sp. Pl. 195. 1753.

Unarmed or spinescent shrubs or rarely small trees with alternate or opposite deciduous or evergreen leaves. Flowers white, blue, or purple, in terminal or axillary panicles or cymes. Calyx 5-lobed, the lobes petaloid and deciduous. Petals hooded, long-clawed. Ovary immersed in the disk and adnate to it at the base, 3-lobed. Disk adnate to the calyx. Style 3-cleft. Capsule somewhat 3-lobed, often crested or horned, separating at maturity into 3 nutlets. [Name used by Theophrastus for some plant.]

An American genus of about 60 species, most abundant in California. Type species, *Ceanothus americanus* L.

Stipules thin and early deciduous; leaves alternate, their stomata on the lower surface never in sunken pits; capsules smooth or sometimes ridged or crested on the middle of the lobes. (Section *Euceanothus*)

Ultimate branches flexible at least not rigidly divaricate and spinose.

Leaves glandular-denticulate, serrulate or serrate (except *Parryi*) and evergreen (except *sanguineus*).

Leaves distinctly 3-nerved from the base, sometimes appearing 1-nerved in *Parryi*.

Branchlets terete.

Leaves deciduous; flowers white.

1. *C. sanguineus*.

Leaves evergreen.

Leaves varnished above and strongly scented; flowers white.

2. *C. velutinus*.

Leaves not varnished above; flowers blue.

Under surface of leaves white-tomentose.

Leaves 5 cm. long or more; flowers in an ample panicle.

3. *C. arboreus*.

Leaves less than 5 cm. long; flowers in a small raceme.

4. *C. tomentosus*.

Under surface of leaves green and glabrous or sparsely pubescent.

Leaves bright green and glabrous on both surfaces; raceme elongated.

5. *C. cyaneus*.

Leaves more or less pubescent on both surfaces; raceme short.

6. *C. oliganthus*.

Branchlets angled and striated.

Leaves plane, distinctly 3-nerved.

Leaves green and glabrous between the veins beneath, the margins not revolute.

7. *C. thyrsiflorus*.

Leaves tomentulose between the veins beneath, margins narrowly revolute.

8. *C. griseus*.

Leaves often appearing 1-nerved, the lateral veins obscured by the strongly revolute margins.

9. *C. Parryi*.

Leaves 1-nerved from the base.

Leaves more or less revolute on the margins.

Upper surface of leaves papillate.

10. *C. papillosus*.

Upper surface of leaves not papillate, or only on the fold of the revolute margin.

Leaves orbicular to broadly elliptic, upper surface deeply grooved over the midrib and lateral veins, the margins sometimes slightly glandular.

11. *C. impressus*.

Leaves elliptic to narrowly oblong, appearing truncate due to the infolding at apex, sometimes glandular-papillate along the apparent margin, the true infolded margin glandular-denticulate.

12. *C. dentatus*.

Leaves plane, their margins not revolute, lateral veins sometimes rather prominent.

Prostrate shrub; flowers few (3-8) in short racemes.

13. *C. diversifolius*.

Erect shrubs with ascending or spreading branches.

Branches elongated, spreading; capsule prominently crested.

14. *C. Lemmonii*.

Branches erect or ascending; crests of the capsule inconspicuous.

Capsule deeply lobed; calyx-lobes narrowly triangular, less than 2 mm. long.

15. *C. foliosus*.

Capsule shallowly lobed; calyx-lobes broadly triangular, 2 mm. long.

16. *C. austromontanus*.

Leaves entire or rarely few-toothed at the apex, plane, branchlets terete.

Capsules 3.5-4.5 mm. broad, obscurely crested and otherwise smooth; leaves deciduous.

Peduncles naked; leaves narrowly oblong, narrowed at base, glabrous, 1-nerved; flowers blue.

17. *C. parvifolius*.

Peduncles more or less leafy; leaves rounded to subcordate at base, 1-3-nerved; flowers white or when blue the leaves pubescent.

18. *C. integerrimus*.

Capsules 5-7 mm. broad, roughened with a wrinkled exocarp and crested with a roughened ridge; leaves 1-nerved, evergreen.

19. *C. Palmeri*.

Ultimate branches rigidly divaricate and spinose; leaves evergreen, plane.

Leaves 1-nerved and finely pinnate-veined; oblong-elliptic, bright green, entire; flowers blue.
20. *C. spinosus*.

Leaves 3-nerved or in small-leaved forms, the lateral nerves obscure.

Flowers blue; leaves abundantly glandular-serrate, glabrous above; branchlets pubescent.
21. *C. sorediatus*.

Flowers white; leaves mostly entire or on vigorous shoots, sparingly toothed, the teeth with or without glands.

Bark gray-green; rather compact erect shrubs; leaves ovate to oblong-ovate, mostly less than 15 cm. long, glabrous.
22. *C. leucodermis*.

Bark nearly white; widely spreading shrubs; leaves ovate to ovate-orbicular.

Capsules smooth except for low crests; panicles usually simple; leaves mostly entire, pale green on both surfaces and nearly or quite glabrous.
23. *C. cordulatus*.

Capsules roughened with a thick exocarp; panicles usually compound.
24. *C. incanus*.

Stipule-bases persistent, thick and corky; capsules usually with dorsal or apical horns; flowers umbellate; leaves firm-coriaceous and persistent. (Section *Cerastes*)

Leaves alternate; flowers white.

Horns of the capsule dorsal and prominent; capsule 7-13 mm. in diameter; leaves narrowly obovate, entire, cuneate.
25. *C. megacarpus*.

Horns of the capsule minute or none; capsule about 4-7 mm. in diameter.

Leaves entire, oblanceolate to broadly elliptic, usually alternate but sometimes some of them opposite.
26. *C. insularis*.

Leaves usually denticulate, round-obovate to deltoid-obovate, all alternate.
27. *C. verrucosus*.

Leaves opposite; flowers white or blue.

Flowers normally white.

Leaves with their margins more or less revolute, densely tomentose beneath.
28. *C. crassifolius*.

Leaves not revolute.

Horns of the capsule dorsal (near the middle) and spreading, usually minute; leaves usually toothed, not cuneate.

Leaves grayish green above, densely tomentulose beneath, minutely denticulate or entire.
29. *C. vestitus*.

Leaves rather bright yellowish green, nearly or quite glabrous above, spinose-toothed all around.
30. *C. perplexans*.

Horns of the capsule near the apex, erect and slender.

Erect shrub 1-2 m. high.

Leaves entire, cuneate at base.
31. *C. cuneatus*.

Leaves mostly toothed, obtuse or rounded at base.
32. *C. Ferrisiae*.

Prostrate shrub forming mats; leaves entire or with a few small teeth at the rounded or truncate apex.
33. *C. fresnensis*.

Flowers normally blue, sometimes lavender or rarely nearly white.

Fruiting capsules 4-5 mm. broad, their horns short or slender and the intermediate surface smooth or nearly so, not crested.

Leaves not spinulose-toothed, either entire or denticulate, plane not sinuate and holly-like.

Leaves entire or denticulate at the apex.

Plants prostrate. (See also *C. fresnensis*.)

Leaves oblanceolate to narrowly elliptic, less than 6 mm. broad, with 1-3 small teeth at the apex.
34. *C. pumilus*.

Leaves nearly orbicular, entire or with several minute teeth; flowers lavender to nearly white.
35. *C. ramulosus*.

Plants not prostrate.

Branches mostly elongated and arched; leaves not crowded, entire or often few-toothed above.
36. *C. ramulosus*.

Branches usually straight and rigid; leaves crowded on short lateral branchlets, mostly toothed and retuse at apex; flowers dark blue.
37. *C. rigidus*.

Leaves denticulate nearly all around, rarely some leaves nearly entire; stipules prominent.

Plants prostrate or with lax divergent and arching stems and branches; leaves 15-30 mm. long.
38. *C. gloriosus*.

Plants with stout rigid and erect stems; branches short and stiff; leaves 5-15 mm. long.
39. *C. Masonii*.

Leaves with sharp spinulose teeth at least at apex, often sinuate and holly-like.

Plants with erect or divergent and arched stems.

Bark usually gray; leaves mostly less than 12 mm. long and 6 mm. broad, with 4-8 coarse spinulose teeth.
40. *C. sonomensis*.

Bark brown; leaves over 12 mm. long and 6 mm. wide.

Leaves concave or trough-like above, the margins undulate; stems stout and rigid.
41. *C. pupureus*.

Leaves usually plane, the margins rarely undulate; stems rather weak and arching.
42. *C. divergens*.

Plants prostrate or decumbent.
43. *C. divergens*, subsp.

Fruiting capsules 7-9 mm. broad; horns prominent and wrinkled, and the surface between the horns conspicuously wrinkled and crested or ridged.

Prostrate or decumbent shrub forming mats; leaves spinulose-dentate above, cuneate and entire below.
44. *C. prostratus*.

Erect or spreading shrubs, forming rounded clumps about 1 m. high or less; leaves toothed all around.

Leaves mostly plane, not deflexed, rather finely denticulate with 6-8 rather coarse teeth on each side.
45. *C. pinetorum*.

Leaves undulate and strongly spinose-toothed all around with 4-5 coarse spinose teeth on each side.
46. *C. Jepsonii*.



3106



3108



3107



3109



3110

3106. *Rhamnus Purshiana*
3107. *Rhamnus rubra*

3108. *Rhamnus californica*
3109. *Rhamnus alnifolia*

3110. *Rhamnus crocea*

1. *Ceanothus sanguineus* Pursh. Northern Buck-brush or Oregon Tea-tree.

Fig. 3111.

Ceanothus sanguineus Pursh, Fl. Amer. Sept. 1: 167. 1814.

Ceanothus oregonus Nutt. in Torr. & Gray, Fl. N. Amer. 1: 265. 1838.

Shrub, 1-3 m. high, the branchlets usually reddish brown, glabrous. Leaves deciduous, elliptic to ovate-elliptic, obtuse at apex, rounded or subcordate at base, glandular-serrulate, 2.5-7 cm. long, light green and rather thin, glabrous above, the petioles, veins and young twigs short-villous; panicles lateral on the twigs of the previous season, 5-10 cm. long; flowers white; capsule 3-lobed, smooth.

In open forests, mainly Canadian Zone; western British Columbia to western Montana, southward through the Pacific States to northern California. Type locality: probably Lolo Creek, Idaho. Originally collected by Lewis and Clark. May-July.

2. *Ceanothus velutinus* Dougl. Sticky Laurel or Tobacco-brush. Fig. 3112.

Ceanothus velutinus Dougl. ex Hook. Fl. Bor. Amer. 1: 125. 1830.

Shrub, 1-2 m. high, much branched, stout, the branchlets olive-brown to reddish brown, puberulent. Leaves evergreen, 2.5-8 cm. long, oval, obtuse or rounded at apex, subcordate at base, finely and closely glandular-denticulate, firm-coriaceous, dark green, smooth and varnished above, pale, puberulent beneath and prominently 3-nerved; panicles borne in the axils of the leaves of the previous season, puberulent; flowers white; capsule 3-lobed at summit, nearly smooth.

Open woods and mountain slopes, mainly Canadian Zone; British Columbia to Montana, South Dakota, Colorado, Utah and in the Pacific States to the North Coast Ranges and the southern Sierra Nevada, California.

Type locality: "Subalpine hills near the source of the Columbia and at the Kettle Falls." April-July. Mountain Balm.

Ceanothus velutinus var. *laevigatus* (Hook.) Torr. & Gray, Fl. N. Amer. 1: 686. 1838. Distinguished from the typical species by the glabrous twigs and leaves. Vancouver Island southward west of the Cascade Mountains to the North Coast Ranges, California. Type locality: Nootka, Vancouver Island, British Columbia.

Ceanothus velutinus var. *Lorenzénii* Jepson, Man. Fl. Pl. Calif. 619. 1925. Leaves smaller, not varnished above; panicles shorter. Probably a hybrid between *C. velutinus* and *C. cordulatus*. Occasional from Mount Shasta to the southern Sierra Nevada, California. Type locality: Junction Meadow, Tulare County.

3. *Ceanothus arboreus* Greene. Catalina *Ceanothus*. Fig. 3113.

Ceanothus arboreus Greene, Bull. Calif. Acad. 2: 144. 1886.

Ceanothus velutinus var. *arboreus* Sargent, Garden & Forest 2: 364. 1889.

Ceanothus arboreus var. *glabra* Jepson, Man. Fl. Pl. Calif. 619. 1925.

Arborescent shrub or small tree, 3-6 m. high, twigs remaining canescent with a fine dense tomentum for one or two years then becoming glabrous and reddish brown. Leaves 3-8 cm. long, broadly ovate to elliptic, obtuse or acute, obtuse to subcordate at base, glandular-serrulate, dull green above and velvety with a fine soft pubescence, canescent beneath with a dense short tomentum, prominently 3-ribbed; panicles ample, often 8-12 cm. long; flowers pale blue; capsule 6-7 mm. broad, 3-lobed, wrinkled and prominently crested on the back of each lobe.

Mountain slopes, Upper Sonoran Zone; Santa Cruz, Santa Rosa, and Santa Catalina Islands, California. Type locality: northern slopes at higher elevations, Santa Cruz Island. March-April.

4. *Ceanothus tomentosus* Parry. Woolly-leaved *Ceanothus*. Fig. 3114.

Ceanothus tomentosus Parry, Proc. Davenp. Acad. 5: 190. 1889.

Ceanothus oliganthus var. *tomentosus* K. Brandg. Proc. Calif. Acad. II. 4: 198. 1894.

Shrub, 1-3 m. high with grayish brown bark, the branchlets slender, rusty-tomentose when young. Leaves 8-25 mm. long, ovate to elliptic, glandular-serrulate, dull green and minutely velvety above, densely white-tomentose beneath; peduncles often bearing one or two leaves at base; panicle simple, 2.5-5 cm. long; flowers pale violet-blue or sometimes nearly white; capsule about 4 mm. broad, 3-lobed, the lobes smooth or slightly crested.

Dry rocky ridges, Upper Sonoran Zone; foothills of the Sierra Nevada, from Nevada County to Mariposa County, California. Type locality: brown sandstone ledges, Ione, Amador County. April-May.

Ceanothus tomentosus var. *olivaceus* Jepson, Man. Fl. Pl. Calif. 621. 1925. Under surface of the leaves gray-green with a fine velvety pubescence; capsule more glutinous and becoming very dark in age. Chaparral slopes of southern California in San Bernardino and San Diego Counties south to northern Lower California. Type locality: Clevinger Canyon, Ramona, San Diego County.

5. *Ceanothus cyaneus* Eastw. San Diego *Ceanothus*. Fig. 3115.

Ceanothus cyaneus Eastw. Proc. Calif. Acad. IV. 16: 361. 1927.

Arborescent shrub up to 4 m. high, with gray-brown bark, the branchlets sparsely puberulent or glabrous, usually bearing scattered brownish sessile glands. Leaves elliptic-ovate to ovate, finely glandular-serrulate, 1.5-4 cm. long, light green and glabrous above, scarcely paler beneath, thinly puberulent; peduncles elongated, the lower often bearing a few leaves; panicles simple or the terminal ones compound, 5-15 cm. long; flowers bright blue; capsule shallowly 3-lobed, smooth, crests small, usually evanescent.

Canyon slopes, Upper Sonoran Zone; foothills of eastern San Diego County, California. Type locality: Lakeside, San Diego County, California. April-May.

6. *Ceanothus oliganthus* Nutt. Hairy *Ceanothus*. Fig. 3116.

Ceanothus oliganthus Nutt. in Torr. & Gray, Fl. N. Amer. 1: 266. 1838.

Ceanothus hirsutus Nutt. in Torr. & Gray, loc. cit.

Ceanothus divaricatus Nutt. in Torr. & Gray, loc. cit.

Arborescent shrub, 1.5-3 m. high, the branches not rigid-spinescent, hirsute, the older becoming smooth and brownish. Leaves 1.5-4.5 cm. long, ovate, obtuse to acutish, rounded to subcordate at base, glandular-denticulate, dull green above and sparingly pubescent, pale beneath and more or less densely hirsute-pubescent, the veins slender; petioles 1 cm. long or less; panicles simple, 1.5-3 cm. long; peduncles short, leafless; flowers deep violet; capsule about 4 mm. broad, shallowly lobed, the lobes resinous and wrinkled, rather strongly crested.

Chaparral slopes, Upper Sonoran Zone; cismontane region of southern California from southern San Luis Obispo County to San Diego County. Type locality: Santa Barbara. March-April.

Ceanothus oliganthus var. *Orcuttii* (Parry) Jepson, Man. Fl. Pl. Calif. 621. 1925. (*Ceanothus Orcuttii* Parry, Proc. Davenp. Acad. 5: 194. 1889.) Flowers pale violet; capsule villous, more viscid and wrinkled. Cuyamaca Mountains, San Diego County, California. Type locality: high mountains east of San Diego.

7. *Ceanothus thyrsiflorus* Esch. Blue-brush or Blue-blossom. Fig. 3117.

Ceanothus thyrsiflorus Esch. Mém. Acad. St. Pétersb. VI. 10: 285. 1826.

Arborescent shrub or small tree, 1-4 m. high with slender flexible ascending branches, the younger twigs angled, green, glabrous or sparsely pubescent, somewhat viscid. Leaves 2-6 cm. long, oblong-elliptic, acutish or obtuse at apex, narrowed at base, rather remotely and sometimes obscurely glandular-serrulate; dark green and glabrous above, pale green below and sparsely hairy on the prominent veins; panicle simple or often compound, 4-8 cm. long; peduncles often

elongated, usually with a few leaves below; flowers pale to deep blue, rarely nearly white; capsule about 3 mm. broad, slightly lobed, nearly smooth, somewhat viscid.

Open woods and canyon slopes, mainly Humid Transition Zone; Coast Ranges from Douglas County, Oregon, to Santa Barbara County, California. Type locality: California. April-June.

8. *Ceanothus griseus* (Trelease) McMinn. Carmel Ceanothus. Fig. 3118.

Ceanothus thyrsiflorus var. *griseus* Trel. in A. Gray, Syn. Fl. N. Amer. 1: 415. 1897.

Ceanothus griseus McMinn, Ceanothus 210. 1942.

Erect shrub, 1-3 m. high with stout angled green branchlets. Leaves broadly ovate, obtuse at apex, 1.5-4 cm. long, dark green and glabrous above, gray-tomentulose or silky beneath, veins prominent on the lower surface, margins slightly revolute; flowers violet-blue, in dense panicles 2-5 cm. long; capsule globose, about 4 mm. broad, glandular-viscid when young, becoming black and shiny in age.

Vicinity of the coast, Humid Transition and Upper Sonoran Zones; southern Mendocino County to northern Santa Barbara County, California. Type locality: vicinity of Monterey, California. March-May.

Ceanothus griseus var. *horizontalis* McMinn, Ceanothus 210. 1942. This is a low-spreading or prostrate form growing "on the wind-swept bluffs above the ocean at Yankee Point, Monterey County, California," the type locality. It is probable that environment rather than heredity accounts for the low growth of these plants.

9. *Ceanothus Párryi* Trel. Parry's Ceanothus or Lady-bush. Fig. 3119.

Ceanothus Parryi Trel. in Proc. Calif. Acad. II. 1: 109. 1888.

Ceanothus integerrimus var. *Parryi* K. Brandg. Proc. Calif. Acad. II. 4: 183. 1894.

Low or arborescent shrub, 1-4 dm. high, the bark becoming grayish or reddish brown, branchlets slender, often elongated and weak, angled, pubescent. Leaves 1.5-3 cm. long, narrowly oblong to oblong-elliptic, glandular-serrulate to subentire, the margin revolute, upper surface dark green, glabrous or sparingly pubescent, the veins more or less impressed, lower surface pale gray-green and arachnoid-tomentose; veins simply pinnate or lateral pair at base prominent; panicles simple or nearly so, rather narrow, 5-15 cm. long, usually on elongated leafy peduncles; flowers violet-blue; capsules only slightly lobed, smooth, 3-4 mm. broad.

Mountain slopes and canyons, mainly Transition Zone; California Coast Ranges from Humboldt County to Napa and Marin Counties. Type locality: originally described from specimens cultivated at Calistoga, California. April-June.

10. *Ceanothus papillosus* Torr. & Gray. Warty-leaved Ceanothus. Fig. 3120.

Ceanothus papillosus Torr. & Gray, Fl. N. Amer. 1: 268. 1838.

Ceanothus dentatus var. *papillosus* K. Brandg. Proc. Calif. Acad. II. 4: 203. 1894.

Rather a loosely branching shrub, 1-2 m. high, the young branches terete, densely hirsutulous. Leaves 2-5 cm. long, narrowly oblong to linear, the margins revolute, often strongly so, dark green and more or less papillose on the upper surface, gray-green beneath and hirsutulous or tomentose; panicles mostly simple, narrow and densely flowered, 2-5 cm. long; peduncles short or sometimes elongated; flowers deep violet-blue; capsules 3-lobed with narrow crests.

Open or partially shaded slopes, Upper Sonoran and Humid Transition Zones; California Coast Ranges, especially toward the coast, from San Mateo County to San Luis Obispo County. Type locality: the vicinity. Collected by Douglas. A form with the upper surface almost smooth, found on Kings Mountain in San Mateo County, is *C. papillosus* var. *regius* Jepson, Man. Fl. Pl. Calif. 618. 1925. April-May.

Ceanothus papillosus var. *Roweanus* McMinn, Madroño 5: 13. 1939. Usually an erect-spreading shrub, 0.5-2 m. high, with short lateral branches densely clothed with foliage. Leaves narrowly oblong to linear, 1.5-5 cm. long, the margins strongly revolute, retuse at apex, upper surface densely glandular-papillose. Chaparral and borders of woods, mainly Upper Sonoran Zone; San Benito and Monterey Counties to Santa Barbara County, and in scattering communities in Ventura, Orange, and western Riverside Counties, California. Type locality: Mount Tranquillon, Santa Barbara County.

11. *Ceanothus impressus* Trel. Santa Barbara Ceanothus. Fig. 3121.

Ceanothus impressus Trel. in Proc. Calif. Acad. II. 1: 112. 1888.

Ceanothus dentatus var. *impressus* Trel. in A. Gray, Syn. Fl. N. Amer. 1: 415. 1897.

Low branched shrub, 5-15 dm. high. Leaves elliptic to nearly orbicular, 6-12 mm. long, 1-veined from the base, upper surface deeply grooved over the midrib and the lateral veins, margins strongly revolute and sometimes slightly glandular, appearing crenate, loosely villous, especially on the veins beneath; petioles 2-3 mm. long; panicles mostly simple, narrow and densely flowered, 1.5-2.5 cm. long; flowers blue; capsule subglobose, about 4 mm. broad, with prominent lateral crests.

Low hills and sandy mesas, Upper Sonoran Zone; northwestern Santa Barbara County, California. Type locality: "Santa Barbara County." March-April.

Ceanothus impressus var. *nipomensis* McMinn, Ceanothus 219. figs. 12, 13. 1942. Leaves a little larger, lighter green and less deeply grooved over the veins, and the margins less revolute. Sandy soils in the vicinity of Nipomo Mesa, the type locality, San Luis Obispo County, California.

12. *Ceanothus dentatus* Torr. & Gray. Dwarf Ceanothus. Fig. 3122.

Ceanothus dentatus Torr. & Gray, Fl. N. Amer. 1: 268. 1838.

Ceanothus dentatus var. *floribundus* Trel. in A. Gray, Syn. Fl. N. Amer. 1: 415. 1897.

Ceanothus dentatus var. *Lobbianus* Trel. in Proc. Calif. Acad. II. 1: 112. 1888.

Low much-branched shrub, 1 m. or less high, the branchlets short, hirsutulous. Leaves small,



3111



3112



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3114



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3117



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3119

3111. *Ceanothus sanguineus*

3112. *Ceanothus velutinus*

3113. *Ceanothus arboreus*

3114. *Ceanothus tomentosus*

3115. *Ceanothus cyaneus*

3116. *Ceanothus oliganthus*

3117. *Ceanothus thyrsiflorus*

3118. *Ceanothus griseus*

3119. *Ceanothus Parryi*

5–15 mm. long, oblong-elliptic, truncate or dentate at apex, the notch usually accentuated by the irregularly revolute margin, upper surface dark green and hirsutulous, pale or the midvein somewhat impressed, lower surface tomentose and sometimes also somewhat hirsutulous; panicles simple, densely flowered, cylindric or subglobose, mostly less than 2 cm. long; peduncle 1–3 cm. long; flowers deep violet-blue; capsule shallowly lobed, 3.5 mm. broad, with narrow crests.

Usually in sandy or gravelly soil, Upper Sonoran and Transition Zones; California near the coast from Santa Cruz County to northern San Luis Obispo County. Type locality: probably near Monterey. Collected by Douglas. March–April.

13. *Ceanothus diversifolius* Kell. Pine-mat. Fig. 3123.

Ceanothus diversifolius Kell. Proc. Calif. Acad. 1: 58. 1855.

Ceanothus decumbens S. Wats. Proc. Amer. Acad. 10: 335. 1875.

Prostrate shrubs with reddish or green, pubescent and sparingly verrucose branchlets. Leaves 5–15 mm. long, oblong-elliptic to broadly elliptical, obtuse or rounded at base, broadly obtuse to subacute at apex, the margins plane or obscurely and irregularly revolute, beset with slender-stalked glands, dull green and sparsely strigose above, whitened and hirsutulous-tomentose beneath; peduncles 3–4 cm. long, leafless, slender, hirsutulous; flowers in a short few-flowered raceme, pale blue; capsule slightly lobed, 3 mm. broad, smooth with low narrow crests.

Open coniferous forests, Arid Transition Zone; Inner North Coast Ranges and the Sierra Nevada, California. Type locality: Placerville, California. April–May.

Ceanothus serrulatus McMinn, Madroño 2: 89. 1933. Prostrate, forming mats, the branches often rooting. Leaves alternate or a few opposite near the ends of young branchlets, elliptic to elliptic-oblongate, 1–2 cm. long, serrulate, prominently veined beneath and with sunken pits between the reticulations, glabrous above, tomentulose beneath; flowers in short racemes, white or pale blue; fruit unknown. A local plant found in the Lake Tahoe region associated with *C. prostratus*, *C. cordulatus*, and *C. velutinus*. As it combines characters of *Euceanothus* and *Cerastes* sections of the genus it is possibly a sterile hybrid between *C. velutinus* and *C. prostratus*. Type locality: between Emerald Bay and Cascade Lake, Eldorado County, California.

14. *Ceanothus Lemmonii* Parry. Lemmon's Ceanothus. Fig. 3124.

Ceanothus Lemmonii Parry, Proc. Davenp. Acad. 5: 192. 1889.

Low spreading shrub, 3–6 dm. high, with gray bark; branches slender and elongated but rather rigid, the branchlets short, villous-tomentose and glandular. Leaves 8–25 mm. long, oblong-obovate to elliptic-ovate, the very minute or obscure teeth tipped with stalked glands, upper surface dull green, minutely and sparsely strigose, the lower surface pale green, rather densely villous-tomentose, the veins more prominent than in related species; peduncles 2–2.5 cm. long, terminating the short leafy lateral branchlets; racemes 1.5–3 cm. long; flowers violet-blue; capsule 3.5 mm. broad, rather deeply lobed, the dorsal crests rather prominent.

Open coniferous forests, Arid Transition Zone; Trinity and Lake Counties and northern Sierra Nevada from Shasta County to Eldorado County, California. Type locality: Johnson's Ranch near Quincy, Placer County, California. April.

15. *Ceanothus foliosus* Parry. Wavy-leaved Ceanothus. Fig. 3125.

Ceanothus foliosus Parry, Proc. Davenp. Acad. 5: 172. 1889.

Ceanothus diversifolius var. *foliosus* K. Brandg. Proc. Calif. Acad. II. 4: 201. 1894.

Low erect shrub, 1 m. or less high, the branches pubescent and glandular, flexuous. Leaves oblong-elliptic to broadly elliptic, 5–15 mm. long, the margins glandular-denticulate and somewhat undulate, upper surface dark green and sparsely strigose-pubescent, the lower surface pale green and sparsely villous-pubescent, especially on the veins; flowers in short simple panicles or racemes terminating the lateral leafy branchlets, deep violet-blue; capsules 3 mm. broad, 3-lobed, with low narrow crests.

Mountain slopes, mainly Transition Zone; California Coast Ranges, Humboldt and Lake Counties to Santa Cruz County. Type locality: near St. Helena, California. April.

Ceanothus foliosus var. *vineatus* McMinn, Ceanothus 221. 1942. Low shrub with some of the branches procumbent and others erect-arching. Leaves broadly elliptic to obovate, 1–2 cm. long, dark green and sparingly pubescent above, paler beneath with scattered hairs on the veins. Locally distributed in Mendocino and Sonoma Counties. Type locality: near the Vine Hill Schoolhouse, Sonoma County.

Ceanothus foliosus var. *medius* McMinn, op. cit. 222. 1942. Erect shrub with somewhat arching branches, 0.5–2 m. high. Leaves narrowly to broadly elliptic, dull green, finely pilose and glandular above, gray and densely pubescent beneath, glandular-denticulate. Edges of chaparral or burned-over forest areas, in the Coast Ranges of Santa Clara, Monterey, and San Luis Obispo Counties, California. Type locality: Cuesta Pass, San Luis Obispo County.

16. *Ceanothus austromontanus* Abrams. Cuyamaca Ceanothus. Fig. 3126.

Ceanothus austromontanus Abrams, Bull. N.Y. Bot. Gard. 6: 412. 1910.

Low erect shrub, 1 m. high or less, the branches reddish or grayish brown and glandular. Leaves oblong to narrowly ovate, 8–12 mm. long, glandular-denticulate, dark green and sparsely strigose above, pale green beneath and pubescent on the veins; peduncles 3–5 cm. long; racemes a third to half as long; flowers violet-blue; calyx-lobes broadly triangular, nearly 2 mm. long; capsule 3 mm. broad, very shallowly lobed, dorsal crest inconspicuous.

Open coniferous forests, Arid Transition Zone; Cuyamaca Mountains, San Diego County, California. Type locality: between Julian and Cuyamaca Lake, California. April–May.

17. *Ceanothus parvifolius* (S. Wats.) Trelease. Small-leaved Ceanothus.
Fig. 3127.

Ceanothus integerrimus var. *parviflorus* S. Wats. Proc. Amer. Acad. 10: 334. 1875.
Ceanothus parvifolius Trelease, Proc. Calif. Acad. II. 1: 110. 1888.

Shrub 6-12 dm. high, flat-topped with widely spreading branches and slender flexible terete branchlets, glabrous throughout. Leaves oblong, 1-2 cm. long, obtuse at apex, narrowed at base, plane and entire or obscurely 2-3-toothed at apex, bright green, deciduous; inflorescence a simple narrow panicle, 2-4 cm. long, on slender naked peduncles; flowers blue; capsule 4-5 mm. broad, obscurely crested.

Open pine forests, Arid Transition Zone; Sierra Nevada from Butte County to Tulare County, California. Type locality: in the region of Yosemite Valley. May-July. Sweet Birch.

18. *Ceanothus integerrimus* Hook. & Arn. Deer-brush. Fig. 3128.

Ceanothus integerrimus Hook. & Arn. Bot. Beechey 329. 1839-40.
Ceanothus Andersonii Parry, Proc. Davenp. Acad. 5: 172. 1889.

Shrub 1-4 m. high, widely branched, bark pale green, ultimate branchlets slender, flexible, terete, glabrous or somewhat strigose-pubescent. Leaves 15-40 mm. long, oblong to narrowly elliptic or narrowly ovate, entire, or on vigorous shoots obscurely toothed, bright green, glabrous or nearly so above, usually sparsely strigose on the veins beneath, pinnately veined, or somewhat 3-nerved at base; inflorescence a simple or few-branched panicle, 5-10 cm. long, on leafy peduncles; flowers white; capsules shallowly 3-lobed, slightly crested, otherwise smooth, 3.5-4.5 mm. broad.

Mountain slopes and ridges, Arid Transition Zone. This is a polymorphic species with several fairly well-defined varieties. The typical species inhabits the California Coast Ranges from Mendocino County to Ventura County. The extreme narrow-leaved 1-nerved form (*Ceanothus Andersonii*) has been found recently in the Sierra foothills near Rescue, Eldorado County. Type locality: California. Collected by Douglas. April-June.

Ceanothus integerrimus var. *puberulus* (Greene) Abrams, Bull. N.Y. Bot. Gard. 6: 409. 1910. (*Ceanothus puberulus* Greene, Leaflets Bot. Obs. 1: 66. 1904.) Leaves ovate-oval, obtuse, puberulent on the upper surface, silky-pubescent beneath; flowers white. Mountains of southern California from Kern County to Riverside County. Type locality: San Bernardino Mountains.

Ceanothus integerrimus var. *californicus* (Kell.) Benson, Contr. Dudley Herb. 2: 120. 1930. (*Ceanothus californicus* Kell. Proc. Calif. Acad. 1: 55. 1855; *Ceanothus nevadensis* Kell. Proc. Calif. Acad. 2: 152; fig. 45. 1862.) Leaves ovate to broadly ovate, acutish at apex, rounded or subcordate at base, glabrous or nearly so above, sparsely pubescent on the veins beneath, prominently 3-nerved; flowers white. Cascades of Washington to the North Coast Ranges and Sierra Nevada, California. Type locality: Placerville, Placer County, California.

Ceanothus integerrimus var. *macrothyrus* (Torr.) Benson, op. cit. 121. 1930. (*Ceanothus thyriflorus* var. *macrothyrus* Torr. Bot. Wilkes Exp. 263. 1874.) Leaves ovate to oval, obtuse or rounded at apex, more or less densely pubescent on both surfaces; inflorescence a broad compound panicle, 10-20 cm. long, much longer than the short peduncle; flowers blue, rarely white. Humid and Arid Transition Zones; Wasco County and the Umpqua River, Oregon, to Siskiyou and Butte Counties, California. Type locality: "Banks of Umpqua, Oregon."

19. *Ceanothus Palmeri* Trelease. Palmer's Ceanothus. Fig. 3129.

Ceanothus Palmeri Trelease, Proc. Calif. Acad. II. 1: 109. 1888.
Ceanothus spinosus var. *Palmeri* K. Brandg. Proc. Calif. Acad. II. 4: 185. 1894.

Arborescent shrub 2-4 m. high with smooth olive-green bark, branchlets ascending, terete, rather slender and flexible, pale green, glabrous. Leaves evergreen, 15-35 mm. long, linear-oblong to oblong-lanceolate, obtuse or acutish, entire, rather light green above and shiny, pale beneath, glabrous on both surfaces or sparingly strigose on the midrib beneath, 1-nerved; panicles narrow, 5-8 cm. long; flowers white; capsules 5-7 mm. broad with a thick wrinkled exocarp, crested with a roughened ridge.

Open pine forests, Arid Transition Zone; Palomar and Cuyamaca Mountains, San Diego County, California, to northern Lower California. Type locality: Cuyamaca Mountains, San Diego County, California. May-June.

20. *Ceanothus spinosus* Nutt. Green-barked Ceanothus. Fig. 3130.

Ceanothus spinosus Nutt. in Torr. & Gray, Fl. N. Amer. 1: 267. 1838.

Arborescent shrub, 2-7 m. high, the bark smooth olive-green, the main branchlets mostly ascending on the branch and flexible, glabrous, the ultimate ones usually divergent, short, rigid, and spinescent. Leaves mostly oblong-elliptic, entire or, especially on young plants, toothed toward the apex, glabrous or sparingly strigose on the midrib and petiole, bright glossy green above, a little paler beneath, 1-nerved and finely pinnately veined; panicles compound, 3-6 cm. long; flowers bright or pale blue; capsules 4-5 mm. broad, scarcely lobed, smooth, crestless, slightly resinous.

Mountain slopes and canyons, Upper Sonoran Zone; Coast Ranges of southern California, from San Luis Obispo County south to Lower California. Type locality: mountains at Santa Barbara. March-April.

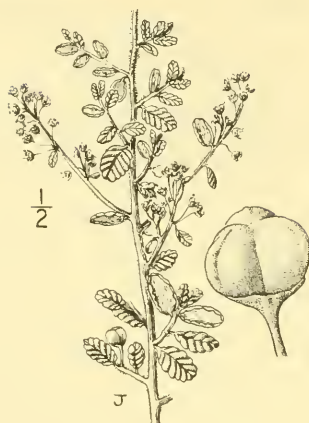
21. *Ceanothus sorediatus* Hook. & Arn. Jim-brush. Fig. 3131.

Ceanothus sorediatus Hook. & Arn. Bot. Beechey 328. 1839-40.
Ceanothus intricatus Parry, Proc. Davenp. Acad. 5: 168. 1889.

Arborescent shrub, 2-4 m. high with smooth gray-green bark, rigid, divaricate somewhat spinose, sparsely appressed-pubescent branchlets. Leaves 1-4 cm. long, elliptic-ovate to ovate, obtuse to subcordate at base, finely glandular-serrulate, plane and firm, dark green, sparsely



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3120. *Ceanothus papillosus*
 3121. *Ceanothus impressus*
 3122. *Ceanothus dentatus*

3123. *Ceanothus diversifolius*
 3124. *Ceanothus Lemmonii*
 3125. *Ceanothus foliosus*

3126. *Ceanothus austromontanus*
 3127. *Ceanothus parvifolius*
 3128. *Ceanothus integerrimus*

strigose above, pale green or slightly canescent beneath, appressed villous-pubescent on the veins, sparsely strigose between; peduncles 1–3 cm. long; racemes simple or compound, 2–5 cm. long; flowers light blue; capsule 4 mm. broad, shallowly lobed, crested, otherwise smooth and resinous.

Mountain slopes, Upper Sonoran and Transition Zones; California Coast Ranges from Humboldt County south to Los Angeles County. Type locality: California. Collected by Douglas. March–April.

22. *Ceanothus leucodermis* Greene. Chaparral Whitethorn. Fig. 3132.

Ceanothus leucodermis Greene, Kew Bull. 1895: 15. 1895.

Ceanothus divaricatus var. *eglandulosus* Torr. Pacif. R. Rep. 4: 75. 1857.

Rigidly branched shrub, 2–3 m. high, the bark smooth pale green, branchlets divaricately spreading, short and spinescent, glabrous or nearly so. Leaves elliptic to ovate, 10–20 mm. long, serrulate or usually entire, plane and firm-coriaceous, dull and rather light green above, gray-green beneath, nearly or quite glabrous; panicles simple or with a few branches, 3–8 cm. long; flowers white or very pale blue; capsules 4 mm. broad, scarcely lobed and the crests obscure, the surface covered with a saponaceous resin.

Chaparral belt of the foothills and lower mountain slopes, Upper Sonoran Zone; Inner Coast Ranges of Alameda County and southern Sierra Nevada, Tulare County, to cismontane southern California and northern Lower California. Type locality: Santa Barbara. March–April.

23. *Ceanothus cordulatus* Kell. Mountain Whitethorn. Fig. 3133.

Ceanothus cordulatus Kell. Proc. Calif. Acad. 2: 124. pl. 39. 1861.

Low spreading shrub, intricately branched, 1–2 m. high with smooth whitish bark, the ultimate branches rigid, divaricate and spinescent, very glaucous, the young sparsely short-pubescent but soon smooth. Leaves alternate, elliptic-ovate to orbicular-ovate, 1–2 cm. long, entire or rarely with a few teeth, plane, light green above and glabrous or sparsely strigose, pale beneath and sparsely strigose, distinctly 3-nerved; flowers in simple panicles or sometimes in racemes, white; capsules deeply lobed and prominently crested with a dorsal ridge, otherwise nearly smooth.

Dry mountain slopes and open pine forests, Arid Transition and Canadian Zones; Cascade Mountains, and Douglas and Curry Counties, Oregon, south to Lower California and east to western Nevada. Type locality: near Washoe, Nevada. June–Aug.

24. *Ceanothus incanus* Torr. & Gray. Coast Whitethorn. Fig. 3134.

Ceanothus incanus Torr. & Gray, Fl. N. Amer. 1: 266. 1838.

Widely branched shrub, 1–3 m. high, with smooth whitish bark, the branchlets smooth and glaucous, the ultimate ones short, divaricate, spinose or stout and blunt. Leaves alternate, elliptic-ovate to orbicular-ovate, 1.5–5 cm. long, entire or rarely serrulate, plane and firm, glabrous and green above, beneath strongly 3-nerved, strigose at least on the nerves, and canescent with a fine close indument between; panicles usually compound, 2–5 cm. long, the rachis and short peduncles tomentose; flowers white; capsule 4.5 mm. broad, the exocarp thick and rugosely roughened.

Canyons and mountain slopes, mainly Humid Transition Zone; California Coast Ranges from Humboldt County to Monterey County. Type locality: California. Collected by Douglas. April–May.

25. *Ceanothus megacarpus* Nutt. Big-podded Ceanothus. Fig. 3135.

Ceanothus macrocarpus Nutt. in Torr. & Gray, Fl. N. Amer. 1: 267. 1838. Not Cav. 1794.

Ceanothus megacarpus Nutt. N. Amer. Sylva 2: 46. 1846.

Ceanothus cuneatus var. *macrocarpus* K. Brandg. Proc. Calif. Acad. II. 4: 205. 1894.

Erect rather compact shrub, 2–3 m. high, the young twigs appressed-pubescent, becoming glabrous and reddish or gray-brown. Leaves alternate, 1–2 cm. long, spatulate to obovate, obtuse to rounded or emarginate at apex, cuneate at base, rather thick and firm, dull green and glabrous above, minutely canescent beneath, the margins slightly revolute, entire or rarely sparsely denticulate; flowers white; capsule 8–12 mm. broad, scarcely lobed, laterally horned, the apical crests low.

Mountain canyons, Upper Sonoran Zone; Coast Ranges of southern California from Santa Barbara County to northern San Diego County. Type locality: hills near Santa Barbara. March–April.

26. *Ceanothus insularis* Eastw. Island Ceanothus. Fig. 3136.

Ceanothus insularis Eastw. Proc. Calif. Acad. IV. 16: 362. 1927.

Erect shrub with stiff rather compact branches, young twigs tomentulose. Leaves alternate or opposite, elliptic to cuneate-obovate, truncate or often retuse at apex, entire, 12–20 mm. long, green and glabrous above, minutely canescent beneath; flowers in small umbel-like clusters, white or with bluish centers; capsule globose, 8–10 mm. in diameter, without horns or crests or with minute subapical or lateral horns.

Canyon slopes, Upper Sonoran Zone; Santa Rosa, Santa Cruz, and Santa Catalina Islands, southern California. Type locality: Santa Cruz Island. Jan.–March.

27. *Ceanothus verrucosus* Nutt. Warty-stemmed Ceanothus or Barranca-brush. Fig. 3137.

Ceanothus verrucosus Nutt. in Torr. & Gray, Fl. N. Amer. 1: 267. 1838.

Erect compactly branched shrub, the young twigs tomentulose, becoming dark grayish brown.



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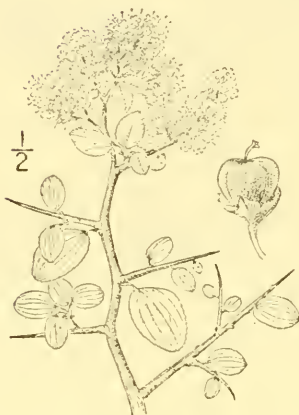
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3129. *Ceanothus Palmeri*
 3130. *Ceanothus spinosus*
 3131. *Ceanothus soresdiatus*

3132. *Ceanothus leucodermis*
 3133. *Ceanothus cordulatus*
 3134. *Ceanothus incanus*

3135. *Ceanothus megacarpus*
 3136. *Ceanothus insularis*
 3137. *Ceanothus verrucosus*

Leaves alternate, usually rather crowded, 5–15 mm. long, suborbicular to cuneate-obovate, retuse to subcordate at apex, obtuse or rounded at base, thick and firm, plane, entire or shallowly toothed, dark green and glabrous above, minutely canescent beneath; flowers corymbose on short axillary peduncles, white; capsules 5 mm. broad, very shallowly lobed, laterally horned and obscurely crested at apex.

Dry hillsides and mesas, mainly Lower Sonoran Zone; western San Diego County, California, and adjacent Lower California. Type locality: San Diego. March–April.

28. *Ceanothus crassifolius* Torr. Hoary-leaved Ceanothus. Fig. 3138.

Ceanothus crassifolius Torr. Pacif. R. Rep. 4: 75. 1857.

Ceanothus verrucosus var. *crassifolius* K. Brandg. Proc. Calif. Acad. II. 4: 208. 1894.

Rigidly branched shrub, 2–3 m. high, with stout canescent or rusty tomentose branches. Leaves opposite, 1.5–3 cm. long, elliptic-obovate, obtuse or rounded at apex, cuneate or rounded at base, thick and leathery, more or less revolute, pungently dentate or rarely entire, becoming glabrous and dark green or yellowish green above, densely white-tomentose beneath; stipules large; flowers white in short umbellate corymbs; capsule 8 mm. broad, with stout erect horns near the apex.

Dry mountain slopes and hillsides, Upper Sonoran Zone; common component of the chaparral from Santa Barbara County, California, to northern Lower California. Type locality: "Mountains south of Los Angeles." Feb.–April.

Ceanothus crassifolius var. *planus* Abrams, Bull. N.Y. Bot. Gard. 6: 415. 1910. This variety closely resembles the typical species in structural characters, but the leaves are not revolute and the venation is distinctly evident through the rather sparse tomentum. This is the more common form of the species in the mountains of Santa Barbara and Ventura Counties, California. Type locality: Red Reef Canyon, Topatopa Mountains, Ventura County.

29. *Ceanothus vestitus* Greene. Mojave Ceanothus. Fig. 3139.

Ceanothus vestitus Greene, Pittonia 2: 101. 1890.

Ceanothus Greggii var. *vestitus* McMinn, Ceanothus 236. 1942.

Erect, rigidly branched shrub, 1–2 m. high, the young branchlets tomentulose. Leaves opposite, elliptic-ovate, 6–15 mm. long, entire or commonly obscurely denticulate, grayish green above and sparsely tomentulose or glabrous, paler beneath and usually tomentulose at least when young; flowers umbellate, white, on very short axillary peduncles; capsules 5 mm. broad, the horns dorsal, spreading, scarcely 1 mm. long.

Dry mountain ridges, especially on the desert slopes, Upper Sonoran Zone; Inner Coast Ranges, San Luis Obispo County, and the Tehachapi Mountains, California, to the San Pedro Martir Mountains, Lower California; the eastern slope of the Sierra Nevada, Mono, and Inyo Counties, to the Panamint Mountains, California, east to Nevada and northwestern Arizona. Type locality: borders of pine forests near Tehachapi, Kern County, California. April–May.

30. *Ceanothus perplxans* Trelease. Cup-leaved Ceanothus. Fig. 3140.

Ceanothus perplxans Trelease in A. Gray, Syn. Fl. N. Amer. 1st: 417. 1897.

Ceanothus Greggii var. *perplxans* Jepson, Man. Fl. Pl. Calif. 623. 1925.

Erect stiffly branched shrub, 1–2 m. high, the young branches conspicuously roughened by the persistent stipules, young twigs tomentose. Leaves opposite, oblong-obovate to nearly orbicular, 1–2 cm. long, entire or often conspicuously denticulate all around, soon glabrous above and glossy yellow-green, canescent beneath and more or less densely tomentose; flowers white, umbellate; capsules 5 mm. long with smooth exocarp, the horns entirely absent or, when present, dorsal and very minute.

Dry mountain ridges, Upper Sonoran Zone; San Jacinto Mountains, California, south to northern Lower California. Type locality: southwestern California. March–May.

31. *Ceanothus cuneatus* (Hook.) Nutt. Common Buck-brush. Fig. 3141.

Rhamnus cuneatus Hook. Fl. Bor. Amer. 1: 124. 1829.

Ceanothus cuneatus Nutt. in Torr. & Gray, Fl. N. Amer. 1: 267. 1838.

Ceanothus oblanceolatus Davidson, Bull. S. Calif. Acad. 20: 53. 1921.

Rigid erect shrub, 1–2.5 m. high, with stiff divergent grayish branches, usually tomentulose when young. Leaves opposite, oblong-obovate, cuneate at base, 8–15 mm. long, entire, dull bluish green above and glabrous, finely whitish-tomentose beneath in the areolae; flowers umbellate, white; capsules 5 mm. broad, the horns erect, conspicuous, but rather slender, exocarp smooth between the horns and usually with small apical crests.

Upper Sonoran and Transition Zones; Willamette Valley, Oregon, south to northern Lower California; a widely distributed and variable species, perhaps comprising several subspecies. Type locality: originally collected by Douglas "near the sources of the Multnomak [Willamette] River, in sandy soils, growing under the shade of *Pinus Lambertiana*." Feb.–April.

32. *Ceanothus Ferrisiae* McMinn. Coyote or Ferris' Ceanothus. Fig. 3142.

Ceanothus Ferrisiae McMinn, Madroño 2: 89. 1933.

Erect shrub, 1–2 m. high, with stiff divergent or arched branches and numerous lateral stri-gose branchlets. Leaves opposite, orbicular, obtuse or rounded at base, 15–25 mm. long, 1-veined from the base, regularly or irregularly short-toothed or sometimes nearly or quite entire, dark green and glabrous above, microscopically canescent beneath; flowers white, in small umbels;

capsule globose, 7–9 mm. broad, with 3 dorsal or subdorsal horns, without intermediate crests but often roughened.

Slopes of hills, Upper Sonoran Zone; along the Coyote River, Mount Hamilton Range, Santa Clara County, California. Type locality: Madrone Springs road, above Coyote Creek. Jan.–March.

33. *Ceanothus fresnensis* Dudley. Fresno *Ceanothus*. Fig. 3143.

Ceanothus fresnensis Dudley ex Abrams, Bot. Gaz. 53: 68. 1912.

Ceanothus rigidus var. *fresnensis* Jepson, Man. Fl. Pl. Calif. 623. 1925.

Prostrate shrub, forming mats, 2–6 m. across, with few erect branches 2–3 dm. high, young twigs tomentulose. Leaves opposite, 6–12 mm. long, oblanceolate to obovate, entire or the truncate or rounded apex minutely few-toothed, firm-coriaceous and involute, tomentulose on both surfaces when young, glabrate above in age; umbels few-flowered, terminating short peduncles; flowers white or pale lavender; capsules about 5 mm. broad and 6 mm. high, the exocarp nearly smooth, the horns subterminal and erect or spreading, slender, 1 mm. high.

Dry ridges in open coniferous forests, Arid Transition Zone; western slopes of central and southern Sierra Nevada, California. Type locality: Stevenson Mountains, Pine Ridge, Fresno County, California. May–June.

Ceanothus arcuatus McMinn, *Ceanothus* 247. 1942. Low rigidly branched shrub, 3–6 dm. high and 6–12 dm. broad, with stiff grayish arching branches and brownish-tomentulose branchlets. Leaves opposite, oblanceolate to obovate or elliptic to oval, 6–12 mm. long, grayish green and minutely strigose above, paler beneath, 1-nerved from the base; flowers white or pale blue, in small umbel-like clusters; capsule globose, 3–6 mm. broad, with slender suberect subapical horns, without intermediate crests.

Open coniferous forests, Arid Transition Zone; western slopes of the Sierra Nevada from Plumas County to Madera County, California. This species is intermediate between *C. cuneatus* and *C. fresnensis* and is probably of hybrid origin. Type locality: Robb's Peak, Eldorado County, California.

34. *Ceanothus pumilus* Greene. Siskiyou *Ceanothus*. Fig. 3144.

Ceanothus pumilus Greene, Erythea 1: 149. 1893.

Ceanothus prostratus var. *profugus* Jepson, Fl. Calif. 2: 479. 1936.

Low spreading or prostrate shrub with stout rigid branches. Leaves opposite, 5–10 mm. long, oblanceolate to oblong-obovate, entire or rather inconspicuously 2–3-toothed at the apex, green and glabrous above; pale beneath and sparsely strigose on the veins; flowers blue, in few-flowered umbels; capsules 4–5 mm. broad, exocarp not wrinkled, the horns very short.

Open coniferous forests and dry ridges, upper Transition and Canadian Zones; Siskiyou Mountains of southern Oregon and northern California. Type locality: mountains near Waldo, Oregon. April–June.

35. *Ceanothus ramulosus* (Greene) McMinn. Coast *Ceanothus*. Fig. 3145.

Ceanothus cuneatus var. *ramulosus* Greene, Fl. Fran. 86. 1891.

Ceanothus ramulosus McMinn, Madroño 5: 14. 1939.

Shrub 6–15 dm. high with spreading or arching branches, usually with smooth grayish bark. Leaves opposite, not crowded on the branches, variable but commonly obovate to broadly elliptic or broadly oblanceolate, 6–20 mm. long, entire or usually with a few teeth near the obtuse to truncate apex, glabrous above, canescent beneath; flowers pale blue-lavender or nearly white, in small-peduncled umbels; fruiting capsule 4–5 mm. broad, usually rather slenderly 3-horned at the apex and sometimes somewhat wrinkled and ridged or crested between the horns.

Dry rocky or sandy soils, mainly Upper Sonoran Zone; outer Coast Ranges from southern Mendocino County to San Luis Obispo County, California. Type locality: "In the Coast Ranges only, and from Santa Cruz Mts. Greene, to Marin and Napa Counties, Mrs. Curran, Dr. Parry." Feb.–April.

Ceanothus ramulosus var. *fascicularis* McMinn, *Ceanothus* 250. 1942. Erect shrub with rough brownish bark. Leaves rather crowded, appearing fascicled, narrowly oblanceolate, or on younger branches shorter and broader, usually entire; fruiting capsules with minute lateral or subapical horns or these sometimes obsolete. Coastal mesas of San Luis Obispo County to northwestern Santa Barbara County, California. Type locality: La Purissima Mission, Santa Barbara County.

36. *Ceanothus rigidus* Nutt. Monterey *Ceanothus*. Fig. 3146.

Ceanothus rigidus Nutt. in Torr. & Gray, Fl. N. Amer. 1: 268. 1838.

Ceanothus verrucosus var. *rigidus* K. Brandg. Proc. Calif. Acad. II. 4: 207. 1894.

Low, much-branched shrub, seldom over 1 m. high, the main branches often arcuate-spreading, young twigs rather stout and rigid, dark brown and minutely tomentose, with short internodes and very leafy. Leaves opposite, cuneate-obovate, 6–15 mm. long, toothed above the middle or only at the rounded or notched truncate apex, or some of them entire, glabrous, dark green and shining above, minutely tomentose in the sunken interstices beneath, and with a few short hairs on the veins, thick and rather rigid; flowers blue in few-flowered axillary umbels; peduncles very short; fruiting pedicels stout about 1 cm. long; capsules 5 mm. broad, scarcely lobed, the dorsal horns very short.

Low hills near the coast, usually in sandy soil, Upper Sonoran and Humid Transition Zones; Monterey Peninsula, Monterey County, California. Type locality: "Bushy woods near Monterey, California." March–April.

37. *Ceanothus gloriösus* J. T. Howell. Point Reyes *Ceanothus*. Fig. 3147.

Ceanothus rigidus var. *grandifolius* Torr. Pacif. R. Rep. 4: 75. 1857.

Ceanothus prostratus var. *grandifolius* Jepson, Man. Fl. Pl. Calif. 624. 1925.

Ceanothus gloriösus J. T. Howell, Leaflets West. Bot. 2: 43. 1937.

Prostrate shrub, the branches stout, conspicuously tomentose when young, becoming almost



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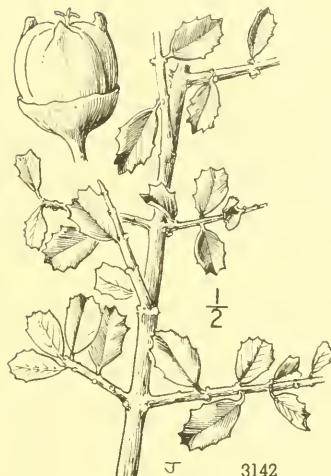
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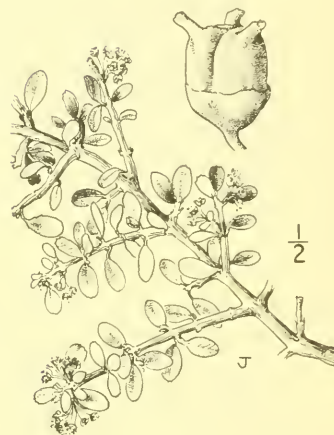
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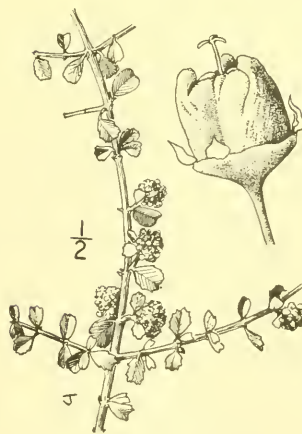
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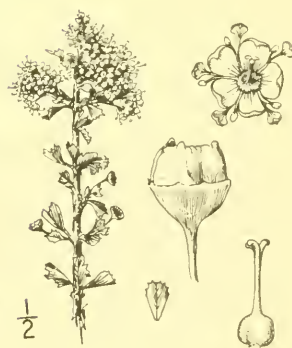
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3138. *Ceanothus crassifolius*
 3139. *Ceanothus vestitus*
 3140. *Ceanothus perplexans*

3141. *Ceanothus cuneatus*
 3142. *Ceanothus Ferrisiae*
 3143. *Ceanothus fresnensis*

3144. *Ceanothus pumilus*
 3145. *Ceanothus ramulosus*
 3146. *Ceanothus rigidus*

glabrous and usually reddish brown the second year. Leaves opposite, elliptic to broadly obovate, 2–5 cm. long, narrowly revolute, prominently and sharply toothed all around, glossy green above and glabrous or with a few hairs on the midrib, glabrous below or sparsely pubescent on the veins, umbels many-flowered, on short stout peduncles; flowers violet-blue; capsules 3.5–4 mm. broad and scarcely as high, the horns small, scarcely 1 mm. high.

Usually in sandy soils, Humid Transition Zone; near the coast, Mendocino County to Marin County, California. Type locality: Anchor Bay, Mendocino County, California. April.

Ceanothus gloriosus var. *exaltatus* J. T. Howell, Leaflets West. Bot. 2: 44. 1937. Erect shrub, 1–2 m. high, rigidly much-branched, the ultimate branches divaricate; otherwise like the typical species. Ridges and canyons, Humid Transition Zone; Outer Coast Ranges, Mendocino, Sonoma, and Marin Counties, California. Type locality: Vine Hill district near Sebastopol, Sonoma County.

38. *Ceanothus Masonii* McMinn. Bolinas *Ceanothus*. Fig. 3148.

Ceanothus Masonii McMinn, Madroño 6: 171. 1942.

Erect or erect-spreading shrub, 0.6–2 m. high, with stout rather stiff divaricate branches, the young branchlets brown or purplish, tomentulose, becoming glabrous in age. Leaves opposite, broadly elliptic to nearly orbicular, 6–18 mm. long, obtuse to rounded or truncate at apex, rounded or occasionally cuneate at base, denticulate all around with a number of small triangular minutely mucronulate teeth, dark green and shining above, microscopically canescent between the netted veinlets beneath; stipules prominent, persistent; flowers dark blue or violet, in small umbel-like clusters terminating short pedunculate lateral branchlets; fruiting capsule globose, about 3.5 mm. broad, with 3 short apical or subapical horns and without intermediate crests.

Dry ridges, Humid Transition Zone; known only from Bolinas Ridge, Marin County, California. Type locality: "Along trail on east end of Bolinas Ridge." March–April.

39. *Ceanothus sonomensis* J. T. Howell. Sonoma *Ceanothus*. Fig. 3149.

Ceanothus sonomensis J. T. Howell, Leaflets West Bot. 2: 162. 1939.

Erect shrub with nearly straight rather stiff gray or brown stems, 5–15 dm. high, bearing opposite short almost spur-like lateral branchlets. Leaves opposite, cuneate-obovate to nearly orbicular, 5–15 mm. long, 3-toothed at the apex and often with 1–2 pairs of lateral teeth, thick, firm and somewhat holly-like, the margins revolute, glossy above, microscopically tomentulose beneath, subsessile; flowers blue to lavender, in small nearly sessile umbels; fruiting capsules globose, 3–4 mm. broad, with 3 short subdorsal horns and low ridge-like intermediate crests.

Mountain slopes, Upper Sonoran Zone; Hood Mountain Range, Sonoma County, California, the type locality.

40. *Ceanothus purpureus* Jepson. Napa *Ceanothus*. Fig. 3150.

Ceanothus purpureus Jepson, Fl. W. Mid. Calif. 258. 1901.

Ceanothus Jepsonii var. *purpureus* Jepson, Man. Fl. Pl. Calif. 624. 1925.

Erect shrub, 1–2 m. high, the branches rigid, divergent, reddish brown and nearly or quite glabrous, clothed with very prominent corky stipules. Leaves opposite, suborbicular to broadly elliptic, strongly undulate, and conspicuously spinose-toothed all around, glossy green and glabrous above, slightly paler beneath and only inconspicuously tomentulose in the areolae; flowers umbellate, dark violet-blue; capsules about 5 mm. broad, horns slender, erect, exocarp smooth between except for 3 small apical crests.

Mountain ridges, Upper Sonoran and Transition Zones; Napa Range, Napa County, California. Type locality: Wooden Valley Grade, Napa Range, California. Feb.–April.

41. *Ceanothus divergens* Parry. Calistoga *Ceanothus*. Fig. 3151.

Ceanothus divergens Parry, Proc. Davenport Acad. 5: 173. 1889.

Ceanothus prostratus var. *divergens* K. Brandg. Proc. Calif. Acad. II. 4: 210. 1894.

Shrub, 5–15 dm. high, the main branches rather weak and divergent or arching, but never decumbent or prostrate. Leaves obovate to oblong, with 5–8 coarse spinescent teeth, undulate, dark green, glabrous and shining above, grayish-tomentulose beneath; flowers blue, in small corymbs racemously disposed on the branchlets; fruiting capsule nearly globose, about 6 mm. in diameter, with 3 prominent dorsal horns, without prominent intervening crests.

In rather open chaparral, Upper Sonoran Zone; originally collected by Parry in the vicinity of Calistoga, Napa Valley, Sonoma County, California. Plants at the original station may have been destroyed by cultivation, but plants matching well the type collections are growing at several stations within four to five miles of Calistoga. Feb.–March.

Ceanothus divergens subsp. *confusus* (J. T. Howell) Abrams. (*Ceanothus confusus* J. T. Howell, Leaflets West Bot. 2: 160. 1939.) Stems decumbent, the main branches with their ends turned upward and 2–4 dm. high. Leaves 6–20 mm. long, ovate to elliptic, more or less cuneate at base, denticulate to spinulose with 3–11 teeth. This subspecies is more widespread than the typical species, occurring at middle elevations in the mountains of Lake, Sonoma, and Napa Counties. Type locality: Rincon Ridge, Sonoma County, California.

Ceanothus divergens subsp. *occidentalis* (McMinn) Abrams. (*Ceanothus prostratus* var. *occidentalis* McMinn, *Ceanothus* 262. 1942.) Plants prostrate forming mats and thereby simulating *C. prostratus* Benth. of the Sierra Nevada, but the leaves and especially the fruits are essentially the same as those of *C. divergens*. Leaves usually undulate and slightly troughed above, with 3–6 or rarely more spinulose teeth; capsules 4–5 mm. broad, their horns slender and spreading. Near the summits of the higher peaks in the North Coast Ranges of Mendocino, Lake, Sonoma, and Napa Counties, California. Type locality: Cobb Mountain, Lake County, California.

42. *Ceanothus prostratus* Benth. Mahala-mats. Fig. 3152.

Ceanothus prostratus Benth. Pl. Hartw. 302. 1848.

Ceanothus prostratus var. *laxus* Jepson, Man. Fl. Pl. Calif. 624. 1925.

Prostrate or low spreading shrub, the branches rooting and often forming large mats, the young branchlets reddish brown, sparsely appressed-pubescent. Leaves cuneate-oblanceolate or -obovate, 8–25 mm. long, several-toothed, or often with only 3 teeth at the apex, thick and coriaceous, glossy green; flowers blue, in small umbels on short stout axillary peduncles; capsules 7–9 mm. broad, with thick and wrinkled exocarp, the horns very stout, usually erect and much wrinkled.

Open pine forests, Transition and Canadian Zones; Klickitat County, Washington, southward, east of the Cascade-Sierra Divide, to western Nevada and the eastern slopes of the Sierra Nevada; west of the Divide it extends from Jackson County, Oregon, to Trinity County and the southern Sierra Nevada, California. Type locality: originally collected by Hartweg in the northern Sierra Nevada. April–June.

43. *Ceanothus pinetorum* Coville. Coville's *Ceanothus*. Fig. 3153.

Ceanothus pinetorum Coville, Contr. U.S. Nat. Herb. 4: 80. 1893.

Ceanothus prostratus var. *pinetorum* K. Brandg. Proc. Calif. Acad. II. 4: 211. 1894.

Erect or more or less spreading shrub, 1–1.5 m. high, the young branches reddish brown and nearly or quite glabrous. Leaves opposite, broadly obovate to suborbicular, denticulate all around, bright green and glabrous above, a little paler beneath and very sparsely or not at all strigose; flowers deep violet-purple, in densely flowered umbels; capsule 7 mm. broad, the horns erect and nearly apical, very stout and wrinkled, the intermediate exocarp also wrinkled and ridged.

Open coniferous forests, upper Arid Transition Zone; southern Sierra Nevada, California. Type locality: near Lyon Meadow, Sierra Nevada, Tulare County, California. May–June.

44. *Ceanothus Jepsônii* Greene. Jepson's *Ceanothus*. Fig. 3154.

Ceanothus Jepsônii Greene, Man. Bay Reg. 78. 1894.

Erect, rigidly branched shrub, 1.5–2 m. high, the branchlets stoutly divaricate, reddish brown and strigose when young. Leaves broadly oval to suborbicular, 1–2 cm. long, strongly spinose, dentate all around, rigidly coriaceous and usually strongly undulate, glabrous and bright glossy green above, inconspicuously strigose below; flowers blue, in open umbels; capsules 6–7 mm. broad, horns near the apex, erect, very stout and wrinkled, the exocarp between the horns thick, wrinkled and ridged.

Rocky ridges, Upper Sonoran and Transition Zones; southern Mendocino and Lake Counties, south to Marin County, California. Type locality: "Open hills in Marin County, near San Geronimo, and northward." April–May.

4. *COLUBRINA* Rich. Ann. Sci. Nat. 10: 368. pl. 15. fig. 3. 1827.

Shrubs or trees, usually with rigid divaricate and sometimes spinescent branches. Leaves alternate, entire or toothed, persistent or deciduous; stipules small and deciduous. Flowers inconspicuous, in small sessile or pedunculate axillary umbels, tomentose. Calyx-lobes tardily deciduous, the tube lined with the disk and adherent to the base of the capsule. Petals minute, hooded and partly enclosing the anthers, sessile or short-clawed. Style short, 3-lobed nearly to the base. Capsule 3-celled and more or less 3-lobed, enclosing a single seed in each cell. [Name from Latin *coluber*, a serpent, the application uncertain.]

About 18 species, natives of the southern United States, Mexico, and South America; one species in the Old World. Type species: *Rhamnus colubrinus* Jacq.

1. *Colubrina californica* I. M. Johnston. California *Colubrina*. Fig. 3155.

Colubrina californica I. M. Johnston, Proc. Calif. Acad. IV. 12: 1085. 1924.

Colubrina texensis var. *californica* L. Benson, Amer. Journ. Bot. 30: 630. 1943.

Intricately branched shrub, 1.5–2.5 m. high, the branches usually divaricate and more or less spinescent and finely grayish-tomentose. Leaves oblong to oblong-obovate, 8–20 mm. long, rounded or obtuse at the apex, obtuse or somewhat cuneate at the base, entire, dull grayish green on both surfaces and more or less tomentose, pinnately veined; flowers in small axillary clusters; calyx and pedicels tomentose; capsule globose, 6 mm. broad.

Dry gravelly washes and bajadas, Lower Sonoran Zone; Eagle Mountains, Riverside County, California; also Arizona and Las Animas Bay, Lower California, the type locality. May–June.

5. *ADÓLPHIA* Meisn. Gen. Pl. 70. 1837.

Shrubs with stiff divaricate spine-tipped opposite branches, articulate with the stems. Leaves opposite, small and mostly caducous, stipitate. Flowers inconspicuous, solitary or in few-flowered axillary clusters. Calyx campanulate, 5-lobed, the lobes persistent. Petals 5, hooded. Ovary 3-celled, free from the calyx-tube; style 3-cleft, articulate near the base. Capsule invested at base by the persistent calyx-tube, but free from it, 3-celled and 3-lobed.



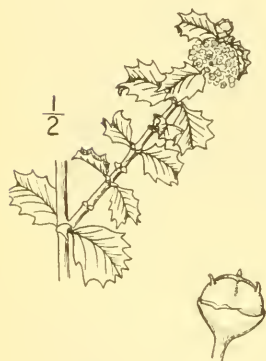
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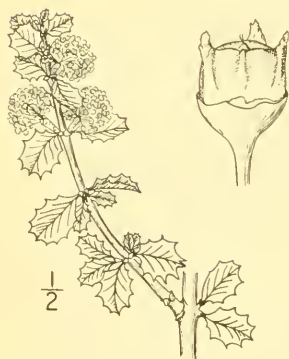
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3147. *Ceanothus gloriosus*
 3148. *Ceanothus Masonii*
 3149. *Ceanothus sonomensis*

3150. *Ceanothus purpureus*
 3151. *Ceanothus divergens*
 3152. *Ceanothus prostratus*

3153. *Ceanothus pinetorum*
 3154. *Ceanothus Jepsonii*
 3155. *Colubrina californica*

Seeds 1 in each cell, with smooth bony testa. [Name in honor of Adolphe Brongniart, a French botanist and monographer of the *Rhamnaceae*.]

A genus of 2 species, natives of Mexico and the arid southwestern United States. Type species, *Adolphia infesta* (H.B.K.) Meisn.

1. *Adolphia californica* S. Wats. California Adolphia. Fig. 3156.

Adolphia californica S. Wats. Proc. Amer. Acad. 11: 126. 1876.

Shrub about 1 m. high, intricately branched, the branches becoming stiff and divaricate, short-pubescent with spreading hairs, green and striate, the ultimate spinescent. Leaves oblong-ob lanceolate to obovate, 5–15 mm. long, obtuse or acutish, tapering at base to a short petiole, entire, puberulent; flowers solitary or few in the axils, short-pedicellate; calyx pubescent, greenish white; petals white, about 2 mm. long, slightly surpassing the calyx-lobes; capsule 4–6 mm. broad.

Dry hillsides or washes, Lower Sonoran Zone; San Diego County, California, to northern Lower California. Type locality: Soledad, San Diego County, California. March–April.

Family 91. VITACEAE.

GRAPE FAMILY.

Climbing or erect shrubs, with nodose joints, alternate petioled leaves, and small flowers in panicles, racemes or cymes. Calyx entire or 4–5-toothed. Petals 4–5, separate or coherent, valvate. Stamens 4–5, opposite the petals; filaments subulate, inserted at the base of the disk or between its lobes; anthers 2-celled. Disk sometimes obsolete or wanting. Ovary 1, generally immersed in the disk, 2–6-celled; ovules 1–2 in each cell, ascending, anatropous. Fruit a 1–6-celled, commonly 2-celled berry. Seed with bony testa and cartilaginous endosperm; embryo short.

About 10 genera and 500 species, widely distributed in temperate and tropical regions.

1. *VITIS* [Tourn.] L. Sp. Pl. 202. 1753.

Climbing or trailing woody vines, mostly with tendrils. Leaves simple, usually palmately lobed or dentate. Stipules generally small, caducous. Flowers dioecious, polygamodioecious, or rarely perfect. Calyx minute, the limb entire. Petals hypogynous or perigynous, coherent in a cap and deciduous without expanding. Ovary 2-celled, rarely 3–4-celled; style very short, conic; ovules 2 in each cell. Berry globose or ovoid, pulpy. [The ancient Latin name.]

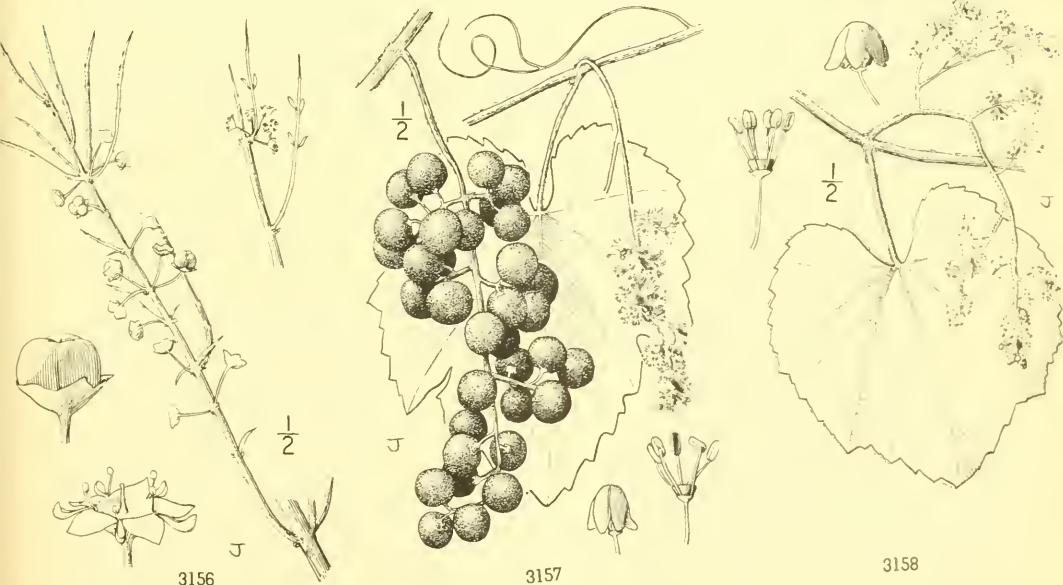
A genus of about 50 species inhabiting temperate and subtropical regions of the northern hemisphere. Type species, *Vitis vinifera* L.

Fruit purple, densely covered with a glaucous bloom; young leaves and shoots clothed with a white arachnoid pubescence.

Fruit black, scarcely or not at all glaucous; leaves usually permanently tomentose beneath.

1. *V. californica*.

2. *V. Girdiana*.



3156. *Adolphia californica*

3157. *Vitis californica*

3158. *Vitis Girdiana*

1. *Vitis californica* Benth. California Wild Grape. Fig. 3157.*Vitis californica* Benth. Bot. Sulph. 10. 1844.

Stout vine often climbing trees to 10 m. or more, bark shreddy, diaphragms thick. Leaves round-cordate or broadly ovate-cordate, with a deep and usually narrow sinus, 7-15 cm. broad, on young vigorous shoots 3-lobed, on others shallowly or not at all lobed, pubescent and often thinly arachnoid on the lower surface, teeth variable, usually broad and very short-apiculate; panicle 5-15 cm. long; flowers small, greenish yellow, fragrant; berries purple, very glaucous, with rather scanty pulp; seeds pyriform, 4 mm. long.

Stream banks, Upper Sonoran Zone; Josephine and Jackson Counties, Oregon, south through the foothills of the Coast Ranges and Sierra Nevada and the Great Valley, to south central California. Type locality: Sacramento River, California. May-June.

2. *Vitis Girdiana* Munson. Desert Grape. Fig. 3158.*Vitis Girdiana* Munson, Proc. Soc. Prom. Agr. Sci. 59. 1887.

Strong climbing vine, 2-12 m. high, the nascent parts densely white-tomentose. Leaves round-cordate, with a deep, narrow or sometimes broad sinus, obscurely or not at all lobed, or sometimes rather deeply 3-lobed, the teeth abruptly apiculate, rather firm in texture, green and glabrous above, more or less densely floccose-tomentose beneath; panicle decompound, 10-15 cm. long, floccose; berries 6-8 mm. in diameter, black, little or not at all glaucous; seed pyriform, 4-5 mm. long.

Stream banks, Upper and Lower Sonoran Zones; Santa Barbara and Inyo Counties, California, southward to northern Lower California on both the desert and coastal slopes. Type locality: San Diego County. May-June.

Family 92. MALVACEAE.*

MALLOW FAMILY.

Herbs or shrubs with mucilaginous juice, stellate pubescence, and alternate, palmately veined, commonly lobed or divided leaves. Stipules small, deciduous. Flowers regular, perfect or polygamo-dioecious. Calyx 5-lobed, valvate in bud, often involuclate-bracteate at the base. Petals 5, hypogynous, convolute in the bud, fused at the base with the staminal tube. Stamens numerous, hypogynous, forming a monodelphous tube about the pistil. Pistil of several to many carpels, commonly with as many cells as styles or stigmas; ovules 1 to several in each carpel. Ovary superior. Fruit a loculicidal capsule or the carpels falling separately. Seeds reniform. Embryo curved; cotyledons plicate or conduplicate; endosperm scanty.

A family of about 45 genera distributed throughout the temperate and tropical parts of the world.

Carpels distinct, separating from the axis and from each other at maturity; seeds not woolly.

Carpels 2-9-ovulate, 1- to several-seeded.

Involucel wanting.

Carpels wingless, smooth on the sides; ovules 2-9.

1. *Abutilon*.

Carpels dorsally winged, reticulate on the sides below; ovules 3.

2. *Horsfordia*.

Involucel of 3 bractlets.

Carpels 2-celled by a horizontal partition, upper chamber filled by the seed.

3. *Modiola*.

Carpels 1-celled, the uppermost portion empty.

Fruit 6-10 mm. high, densely hirsute with simple hairs; carpels smooth laterally; leaves aceriform, thin.

4. *Ihamna*.

Fruit less than 6 mm. high, stellate-pubescent; carpels reticulate laterally toward the base; leaves not aceriform, thick.

5. *Sphaeralcea*.

Carpels 1-ovulate.

Ovule ascending.

Style-branches capitate or truncate.

Carpels smooth on the sides and angles; shrubs.

6. *Malvastrum*.

Carpels reticulate or radiately grooved on the sides or angles; annual herbs.

7. *Eremalche*.

Style-branches filiform, stigmatic on the inner surface.

Involucel wanting; stamens in biseriate phalanges.

8. *Sidalcea*.

Involucel present; stamens in 1 series.

Bracts of the involucel narrow, inserted on the calyx, laterally distinct; pedicels inarticulate.

9. *Malva*.

Bracts of involucel broad, laterally coalesced at the base to form a shallow cup; pedicels articulate at or above the middle.

10. *Lavatera*.

Ovule pendulous or horizontal.

Carpels beakless; petals yellowish, stellate-puberulent on portions exposed in bud.

11. *Sida*.

Carpels beaked; petals bluish, glabrous.

12. *Anoda*.

Carpels forming a loculicidal capsule; seeds somewhat woolly.

13. *Hibiscus*.1. *ABÜTILON* Mill. Gard. Dict. abr. ed. 4. 1754.

Ours annual or perennial herbs, with alternate, cordate, soft-pubescent, entire or serrate leaves and axillary flowers. Involucel none. Ovary 5- to many-celled. Style-branches

* Text contributed by Ira Loren Wiggins.

equaling number of carpels. Carpels 1-celled, leathery or parchment-like, beaked, 2-valved at apex and down the back, persistent, with 1-9 reniform seeds. The upper seeds ascending, the lower pendulous or horizontal. [Name used by Avicenna, an Arabian physician, for some plant.]

A genus of about 110 species of tropical and warm-temperate regions. Ten or 12 species are native or introduced in the United States, chiefly in the southern and southwestern states. Type species, *Abutilon Theophrasti* Medic.

Leaves orbicular, 10-20 cm. wide, velvety; flowers yellow, 12-20 mm. wide; introduced annual.

Leaves ovate-triangular, 1-4 cm. wide, stellate-canescens; flowers brick-red or pink, 6-10 mm. wide; desert mountain perennial.

1. *A. Theophrasti*.

2. *A. parvulum*.

1. *Abutilon Theophrasti* Medic. Velvet Leaf. Fig. 3159.

Sida Abutilon L. Sp. Pl. 685. 1753.

Abutilon Theophrasti Medic. Malv. 28. 1787.

Abutilon Avicennae Gaertn. Fruct. 2: 251. pl. 135. 1791.

Abutilon Abutilon Rydb. Bot. Surv. Neb. 3: 27. 1894.

A stout branching velvety-pubescent annual 1-2 m. high. Leaves ovate-orbicular, cordate, entire or slightly serrate, apex acuminate; petioles 10-20 cm. long; stipules caducous; flowers axillary, solitary or 2 to several on stout, axillary peduncles 1-5 cm. long, bright yellow; calyx-lobes densely velvety-tomentose, ovate, acute to short-acuminate, 6-10 mm. long; petals obovate, 6-9 mm. long, truncate to shallowly emarginate; fruit discoid-orbicular, 2-3 cm. broad, 1 cm. high; carpels 12-15, hirsute, 2-valved; beaks spreading, 3-5 mm. long, acuminate, the tips sharply hooked inward; seeds reniform, gray-brown, sparsely and minutely stellate-puberulent.

Rather a common escape in North America as far west as Texas and Oklahoma. Less frequent in Washington, and reported from Santa Rosa, Riverside, and San Diego in California. Type locality: India. Aug.-Oct.

2. *Abutilon parvulum* A. Gray. Dwarf Abutilon. Fig. 3160.

Abutilon parvulum A. Gray, Smiths. Contr. 3^d: 21. 1852.

Cespitose herbaceous perennial from a woody rootstock, stellate-canescens throughout; stems slender, wiry, 1-3 dm. long. Leaves 1-4 cm. broad, slightly longer, obscurely 3-lobed, ovate-cordate to triangular-cordate, irregularly but distinctly serrate, the lower surface paler than the upper; stipules 1-2 mm. long, caducous; flowers axillary, solitary, brick-red to pink, 6-10 mm. wide; pedicels slender, 10-25 mm. long; calyx 4-5 mm. high, the lobes ovate-lanceolate, reflexed in fruit; petals 3-5 mm. long; fruit 6-8 mm. high, densely stellate-puberulent; carpels 5-8, with short acute, erect beaks 1-2 mm. long; seeds dark brown, minutely puberulent.

Rocky slopes, Lower and Upper Sonoran Zones; from the Providence Mountains, California, through Arizona and New Mexico to southern Colorado, western Texas, and northern Sonora. Type locality: calcareous hills of the San Felipe and San Pedro Rivers, Texas. March-April.

2. *HORSFÓRDIA* A. Gray, Proc. Amer. Acad. 22: 296. 1887.

Erect shrubs with dense stellate yellow- or gray-green pubescence. Leaves thick, orbicular-cordate to lanceolate, entire to finely denticulate or crenulate. Peduncles axillary, 1-flowered or paniculately few-flowered. Involucel none. Corolla yellow, orange or pink. Fruit of 8-12 coalescent carpels that disjoin at maturity, these 3-ovuled, 1-3-seeded, 2-valved above with 2 erect, slightly spreading wings, the upper portion empty, thin and smooth, the lower firm and strongly reticulate. Seeds reniform. [Name in honor of F. H. Horsford, a New England plant collector.]

A genus of 3 species of the southwestern United States and adjacent Mexico. Type species, *Sida alata* S. Wats.

Flowers pink, 15-22 mm. broad; leaves chiefly ovate, slightly viscid; tomentum sordid gray-green.

1. *H. alata*.

Flowers yellow or orange, 10-12 mm. broad; leaves chiefly lanceolate, not viscid; tomentum yellowish.

2. *H. Newberryi*.

1. *Horsfordia alata* (S. Wats.) A. Gray. Pink Velvet-mallow. Fig. 3161.

Sida alata S. Wats. Proc. Amer. Acad. 20: 356. 1885.

Horsfordia alata A. Gray, Proc. Amer. Acad. 22: 297. 1887.

Horsfordia Palmeri S. Wats. Proc. Amer. Acad. 24: 40. 1889.

Shrub 1-3.5 m. high, densely rough-pubescent throughout. Leaves ovate to ovate-lanceolate, subcordate, 1.5-7 cm. long, 1-2.5 cm. broad, sordid-tomentose; petioles 0.5-2 cm. long; stipules triangular-lanceolate, 1-1.5 mm. long, caducous; flowers axillary, solitary or in 2-5-flowered panicles; peduncles slender, about 1 cm. long; pedicels slightly stouter, 2-6 mm. long; calyx 5-7 mm. long at anthesis, the lobes ovate-acuminate, densely stellate-pubescent; petals obovate, 10-12 mm. long, rose-pink; carpels 10-12, empty portion dehiscent early, forming oblong, obtuse, scarious wings three times as long as the reticulate seminiferous part; two upper ovules abortive; seeds reniform, dark, minutely and sparsely puberulent.

Rocky hillside and along desert washes, Lower Sonoran Zone; at Coral Reef Ranch, Coachella Valley, Riverside County, California, and in southern Arizona, Sonora, and Lower California. Type locality: northwestern Sonora. March-April.

2. *Horsfordia Newberryi* (S. Wats.) A. Gray. Newberry's Velvet-mallow.

Fig. 3162.

Abutilon Newberryi S. Wats. Proc. Amer. Acad. 11: 125. 1876.*Horsfordia Newberryi* A. Gray, Proc. Amer. Acad. 22: 297. 1887.

Virgate shrub 1-2.5 m. high, densely tomentose throughout with velvety, pale gold, short-rayed stellate hairs. Leaves ovate-lanceolate, shallowly cordate, 1-4 cm. broad, 3-10 cm. long, entire or faintly serrulate, prominently veined beneath; petioles 1-3 cm. long; stipules minute, caducous; flowers solitary or in 2-3-flowered panicles; pedicels and peduncles 3-20 mm. long; calyx 3-5 mm. long and broad, lobes ovate-acuminate; petals 5-6 mm. long, yellow to orange; staminal column hirsute with simple hairs; fruit 6-8 mm. high, 12-18 mm. in diameter; carpels 8-9, the wings ovate, acute to obtuse, slightly longer than seminiferous portion.

Occasional along washes and on rocky hillsides, Lower Sonoran Zone; western borders of the Colorado Desert to Arizona and south to Sonora and Lower California. Type locality: Canebrake Canyon on the lower Colorado River. March.

3. *MODIOLA* Moench, Meth. 619. 1794.

Perennial herb. Leaves rounded, palmately lobed or divided. Flowers small, axillary. Involucel present. Calyx 5-cleft. Petals entire. Fruit depressed. Carpels 12-30, transversely 2-celled, 2-seeded, longitudinally dehiscent into two subulately beaked valves, cristate dorsally, the sides smooth or wrinkled below. Seeds small, reniform. [Name Latin, *modiolus*, from the likeness of the fruit to a small Roman measure.]

A monotypic genus of tropical and warm-temperature America. Naturalized in the Hawaiian Islands and South Africa. Type species, *Malva caroliniana* L.

1. *Modiola caroliniana* (L.) G. Don. Wheel Mallow. Fig. 3163.*Malva caroliniana* L. Sp. Pl. 688. 1753.*Modiola multifida* Moench, Meth. 620. 1794.*Modiola caroliniana* G. Don, Gen. Hist. Pl. 1: 466. 1831.

Prostrate to ascending, perennial herb with slender, leafy stems, 2-5 dm. long, sparsely pubescent throughout with appressed simple and geminate hairs. Leaves orbicular to ovate-triangular, 1-5 cm. broad, palmately 3-5-lobed or cleft, the divisions dentate to incised; petioles 1.5-10 cm. long, hirsute; flowers axillary, solitary on pedicels 10-15 mm. long; bractlets distinct, ovate, 4-5 mm. long; calyx-lobes ovate-acuminate, 3-5 mm. long, hirsute; petals obovate, 4-6 mm. long, vermilion; carpels 3-4 mm. high, black, cristate, sides striate on lower half, smooth above, transversely wrinkled dorsally.

Roadsides and low ground, Virginia to Florida, west to Texas, and in Central and South America; naturalized in California, Oregon, and the Hawaiian Islands. Type locality: "Carolina." June-Sept.

4. *ILIÁMNA* Greene, Leaflets Bot. Obs. 1: 206. 1906.

Perennial, sparsely pubescent shrubs 0.6-2 m. tall with large, aceriform, thin leaves. Inflorescence of axillary clusters, becoming lax, interruptedly spicate or corymbose-racemose. Involucellate bractlets 3, distinct, persistent. Flowers large, pink to rose-purple or rarely white. Staminal column stout, hirsute. Stamens numerous, in a single series. Fruit subglobose, retuse at the apex. Carpels oblong, thin-walled, smooth laterally, densely pubescent dorsally with coarse, erect simple hairs and smaller intermingled stellate hairs, dehiscent, attached to receptacle by a stout vascular strand. Seeds reniform, 2-4 in each carpel. Embryo curved, cotyledons conduplicate at the apices. Endosperm scanty. [The name is of Greek origin, but its significance is uncertain.]

A genus of 7 species, chiefly in the mountains of western North America from British Columbia to Arizona; *I. remota* occurs in Illinois and western Virginia. Type species, *Malva rivularis* Dougl.

Leaves deeply 5-lobed, truncate or cordate at the base, 6-20 cm. long; plants 1-2 m. high.

Bracts of involucl linear, one-half to two-thirds as long as the calyx-lobes; stellate pubescence fine, rarely overlapping.

Calyx-lobes 6-8 mm. long, acute; herbage sparsely stellate-puberulent; seeds puberulent.

1. *I. rivularis*.

Calyx-lobes 15-20 mm. long, attenuate-acuminate; herbage pubescent with both stellate and simple hairs; seeds glabrous.

2. *I. longispala*.

Bracts of involucl ovate, equaling or exceeding calyx-lobes; stellate-pubescence coarse, overlapping, subscabrous.

3. *I. latibracteata*.

Leaves cuneate-obovate, shallowly crenately 3-lobed, 1-4 cm. long; plants 3-7 dm. high. 4. *I. Bakeri*.

1. *Iliamna rivularis* Torr. Stream-bank Globe-mallow. Fig. 3164.*Malva rivularis* Dougl. ex Hook. Fl. Bor. Amer. 1: 107. 1830.*Sphaeralcea acerifolia* Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 228. 1838.*Sphaeralcea rivularis* Torr. ex A. Gray, Mem. Amer. Acad. II. 4: 23. 1849.*Iliamna rivularis* Greene, Leaflets Bot. Obs. 1: 206. 1906.*Iliamna acerifolia* Greene, loc. cit.*Phymosia acerifolia* Rydb. Bull. Torrey Club 40: 60. 1913.*Phymosia rivularis* Rydb. loc. cit.

Erect paniculately branching perennial 1-2 m. high, sparsely pubescent throughout with short-



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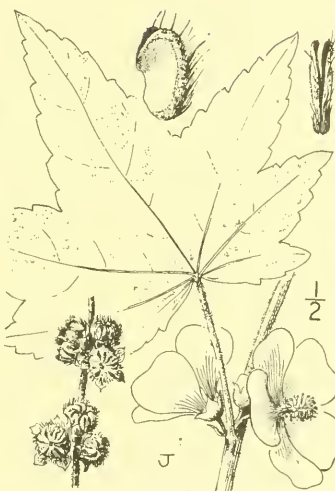
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3159. *Abutilon Theophrasti*
 3160. *Abutilon parvulum*
 3161. *Horsfordia alata*

3162. *Horsfordia Newberryi*
 3163. *Modiola caroliniana*
 3164. *Iliamna rivularis*

3165. *Iliamna longisepala*
 3166. *Iliamna latibracteata*

rayed stellate and scattered simple hairs. Leaves cordate-orbicular to cordate-ovate in outline, 10–20 cm. long, thin, bright green, deeply 5–7-lobed, the lobes triangular-ovate, acute, coarsely dentate with broad rounded teeth; flowers in loose axillary clusters to paniculately racemose; involu-cellate bracts linear-setaceous 4–6 mm. long, one-half to two-thirds as long as the calyx; calyx 6–8 mm. long, finely stellate-puberulent; calyx-lobes broadly triangular-ovate, rounded, abruptly acute; petals obovate, deeply emarginate, 2–2.5 cm. long, rose or white; fruit 8–10 mm. high; carpels ovate-elliptical, acutish at the apex, densely pubescent with stellate and coarse simple bristles dorsally, 3–4-seeded; seeds reniform-orbicular, minutely puberulent.

Along banks of streams, Upper Sonoran and Arid Transition Zones; British Columbia to Montana, Utah, Colorado, and northern New Mexico. Type locality: "North-West America, from the ocean to the Rocky Mountains." June–Aug.

2. *Iliamna longisepala* (Torr.) Wiggins. Chelan Globe-mallow. Fig. 3165.

Sphaeralcea longisepala Torr. Bot. Wilkes Exp. 255. 1874.

Phymosia longisepala Rydb. Bull. Torrey Club 40: 61. 1913.

Iliamna longisepala Wiggins, Contr. Dudley Herb. 1: 227. 1936.

Erect paniculately branching perennial 1–2 m. high, sparsely pubescent throughout with simple, forked, and few-rayed stellate hairs. Leaves cordate-orbicular to truncate-pentagonal in outline, 6–10 cm. long, about as wide, 5-lobed, the lobes acutely triangular to rounded-ovate, coarsely dentate; stipules 6–8 mm. long, subulate-lanceolate, caducous; inflorescence paniculately branched, lax; involu-cellate bracts linear, 5–8 mm. long; calyx 15–20 mm. high, hirsute with few-rayed hairs 1–2 mm. long, the lobes lanceolate, acuminate-attenuate; petals rose-pink, 2–2.5 cm. long; fruit truncate-globose, 6–8 mm. high; carpels ovate-elliptic, 2–3-seeded, densely hirsute-bristly on the back; seeds reniform, dark brown, glabrous.

Mountain slopes, Upper Sonoran and Arid Transition Zones; Chelan and Kittitas Counties, Washington. Type locality: Upper Columbia. July–Aug.

3. *Iliamna latibracteata* Wiggins. California Globe-mallow. Fig. 3166.

Iliamna latibracteata Wiggins, Contr. Dudley Herb. 1: 225. pl. 20. 1936.

Sphaeralcea rivularis var. *cismontana* Jepson, Fl. Calif. 2: 504. 1936.

Perennial shrub 1–2 m. high, stellate-pubescent throughout. Leaves palmately 5–7-lobed, 8–20 cm. long, the lobes broadest about the middle, serrate or irregularly dentate; petioles 5–10 cm. long; stipules subulate, 6–10 mm. long, deciduous; involu-cellate bractlets broadly elliptic-lanceolate to broadly ovate, acute to short-acuminate, 10–14 mm. long, equaling or surpassing the calyx-lobes; calyx-lobes triangular-ovate, 5–8 mm. broad, 8–10 mm. long, broadly rounded and abruptly short-acuminate; petals 2.5–3 cm. long, rose-purple; fruit subglobose, 8–10 mm. high, 10–15 mm. broad; carpels 10–14, glabrous laterally, densely hirsute dorsally; seeds 2 mm. high, puberulent.

Creek banks and moist ground, Humid Transition Zone; Coos and Douglas Counties, Oregon, to northern Humboldt County, California. Type locality: Prairie Creek, California. June–Aug.

4. *Iliamna Bakeri* (Jepson) Wiggins. Baker's Globe-mallow. Fig. 3167.

Sphaeralcea Bakeri Jepson, Man. Fl. Pl. Calif. 635. 1925.

Iliamna Bakeri Wiggins, Contr. Dudley Herb. 1: 228. 1936.

Herbaceous perennial 3–7 dm. high, several erect stems from a woody rootstock, more or less stellate-pubescent throughout. Leaves suborbicular to cuneate-obovate, the lower more or less truncate at the base, crenately 3-lobed and irregularly serrate, 1.5–3 cm. long, finely and closely stellate-puberulent; flowers solitary or in 2–3-flowered axillary clusters; peduncles 5–15 mm. long, stout; bracts linear, about 8 mm. long; calyx 9–12 mm. high, the lobes round-ovate, abruptly acute to short-acuminate, 4–6 mm. high at anthesis, densely stellate-pubescent; petals rose-pink, 15–20 mm. long; fruit depressed-globose, about 8–10 mm. high, 10–15 mm. wide; carpels smooth on the sides, closely stellate-pubescent and densely hirsute dorsally; seeds 3–4 in each carpel, reniform, about 2 mm. long, dark brown, finely stellate-puberulent.

Rocky slopes and chaparral, Arid Transition Zone; southern border of Klamath County, Oregon, and Siskiyou, Modoc, and Shasta Counties, California. Type locality: Fall River Valley, California. July–Aug.

5. *SPHAERÁLCEA* St. Hil. Fl. Bras. Merid. 1: 209. 1825.

Annual or perennial herbs, usually suffrutescent at the base, stellate-pubescent throughout. Leaves alternate, of various outlines. Flowers in axillary clusters or in terminal panicles, racemes or sometimes corymbs. Calyx 5-cleft. Involu-cellate bractlets 3. Petals 5, white, rose, orange or rose-purple. Staminal column slender, antheriferous at the summit. Fruit spherical or subspherical. Carpels 5–20, 1–3-ovulate, 1–3-seeded, upper ovules pendulous, often abortive. Carpels with an empty apical portion that is smooth laterally and dehiscent at maturity, and a seminiferous, indehiscent, laterally reticulate lower portion. Seeds reniform, smooth or hispidulous, dark brown to black. Embryos curved, cotyledons conduplicate at the apices. [Name Greek, alluding to the spherical fruit.]

A genus of about 50 species in the drier parts of North and South America, South Africa, Caledonia, and Australia. Type species, *Sphaeralcea cisplatina* St. Hil.

Plants annual or biennial, not markedly suffrutescent; smooth, dehiscent part of the carpel forming less than one-third of the carpel, much narrower than the indehiscent part.

Carpels 2.5–3 mm. high, notch about one-third the width of the carpel; plant densely yellow-canescant, biennial. 1. *S. Orcuttii*.

Carpels 1.2–2.5 mm. high, notch not over one-fourth the width of the carpel; plant sparsely pubescent, bright green, annual. 2. *S. Coulteri*.

Plants perennial, distinctly suffrutescent; smooth dehiscent part of the carpel forming over one-third of the carpel, as wide or wider than the indehiscent portion.

Indehiscent part of the carpels rugose or muricate dorsally; reticulations coarse, prominent.

Fruit truncate-conical, not strongly depressed; carpels cuspidate, not conspicuously galeate.

3. *S. Emoryi*.

Fruit hemispherical or nearly so, strongly depressed; carpels mucous or mucronulate, conspicuously galeate. 4. *S. ambigua*.

Indehiscent part of the carpels smooth dorsally; reticulations fine, usually inconspicuous.

Calyx conspicuously more densely pubescent than the stems and leaves. 5. *S. Rusbyi cremicola*.

Calyx and leaves equally pubescent.

Leaves 3–10 times as long as wide, basal lateral lobes not over one-tenth as long as the mid-lobe; carpels oblong-ovate, twice as high as broad. 6. *S. angustifolia cuspidata*.

Leaves about as wide as long, lateral lobes usually equaling mid-lobe; carpels broadly ovate to nearly orbicular, nearly or quite as broad as high.

Carpels acute at apex, mucronate or cuspidate; fruit equaling or higher than the calyx; leaves thick, rugose. 7. *S. parvifolia*.

Carpels rounded or obtuse at apex, sometimes mucous; fruit shorter than the calyx; leaves thin, not rugose.

Herbage bright green, sparsely pubescent; leaves cuneate to subcordate, rarely strongly cordate. 8. *S. Munroana*.

Herbage densely whitish- or grayish-pubescent; leaves usually strongly cordate. 9. *S. grossulariacifolia*.

1. *Sphaeralcea Orcuttii* Rose. Orcutt's Desert-mallow. Fig. 3168.

Sphaeralcea Orcuttii Rose, Contr. U.S. Nat. Herb. 1: 289. 1893.

Annual or biennial, 1 to several erect stems 5–10 dm. high from a large taproot, canescent-stellate throughout. Leaves ovate-lanceolate to subhastate, 2–5 cm. long, thick, entire to slightly crenulate; petioles 5–25 mm. long; flowers crowded on flexuous peduncles in narrow panicles; calyx 4–7 mm. long, the lobes incurved over mature fruit; petals 8–12 mm. long, emarginate, scarlet; fruit depressed-globose, densely puberulent; carpels about 2–3 mm. high, usually 1-seeded, deeply reticulate on the sides except on the short, sharply incurved empty portion.

Washes and sandy places, Lower Sonoran Zone; the Colorado Desert, California, into Arizona and northwestern Sonora and middle Lower California. Type locality: near Canso Creek, Colorado Desert. March–Aug.

2. *Sphaeralcea Coulteri* (S. Wats.) A. Gray. Coulter's Desert-mallow. Fig. 3169.

Malvastrum Coulteri S. Wats. Proc. Amer. Acad. 11: 125. 1876.

Sphaeralcea Coulteri A. Gray, Proc. Amer. Acad. 22: 291. 1887.

Annuals, sparsely pubescent throughout, stems several, erect or ascending, up to 15 dm. high, usually less than 5 dm. high. Leaves thin, soft, broadly ovate to orbicular, sparsely pubescent and bright green, truncate or cordate at the base, obscurely to distinctly 3–5-lobed, 1.5–3 cm. long, coarsely crenate; inflorescence thyrsoid; calyx 5–7 mm. high, lobes ovate-lanceolate, acuminate; petals salmon-orange, 8–15 mm. long; fruit hemispherical; carpels 1.5–2.5 mm. high, reniform, shallowly notched, truncate or rounded at the apex, mucous, finely stellate-pubescent dorsally, indehiscent part two-thirds to three-fourths of the carpel, wider than the dehiscent part, prominently fenestrate-reticulate on sides and back.

Sandy or rocky soil or sometimes in heavy clay, Lower Sonoran Zone; southeastern California through Arizona and Sonora to Sinaloa. Type locality: southeastern California. March–April.

3. *Sphaeralcea Emoryi* Torr. Emory's Desert-mallow. Fig. 3170.

Sphaeralcea Emoryi Torr. ex A. Gray, Mem. Amer. Acad. II. 4: 23. 1849.

Sphaeralcea angustifolia var. *gavisa* Jepson, Fl. Calif. 2: 502. 1936.

Perennial with several to many erect stems 6–12 dm. high, densely gray-canescant throughout. Leaves ovate to ovate-oblong, 2–9 cm. long, 1–6 cm. wide, cordate at the base, angulate or shallowly 3-lobed near the base, crenulate to irregularly crenate, prominently veined beneath; inflorescence a narrow, interrupted thyrs, leafy to the apex; calyx 5–10 mm. high, the lobes ovate, acute to lance-acuminate, 1–2 times as long as the tube; petals pink, lavender or grenadine, 1–2 cm. long; fruit truncate-conical, often equaling the calyx; carpels 3.5–6 mm. high, deeply notched, prominently beaked, dehiscent part erect, tipped with cusps 1–1.5 mm. long, indehiscent portion forming one-third to one-half of the carpel, coarsely reticulate, usually 2-seeded.

Sandy soil or loam in fields and along roadsides, Lower Sonoran Zone; southeastern California to Nevada, Arizona, and northern Lower California. Type locality: valley of the Gila River, Yuma County, Arizona. April–Oct.

Sphaeralcea Emoryi subsp. *variabilis* (Cockerell) Kearney, Univ. Calif. Pub. Bot. 19: 39. 1935. (*Sphaeralcea Fendleri* var. *californica* Parish, Zoe 5: 71. 1900.) Similar to the species but with more deeply divided, thinner, greener, less pubescent leaves; carpels with somewhat longer cusps. Southwestern Arizona and southern California in the Lower Sonoran Zone. Type locality: Phoenix, Arizona.

Sphaeralcea Emoryi subsp. *nevadensis* Kearney, Univ. Calif. Pub. Bot. 19: 40. 1935. Differs from the species and subspecies *variabilis* in having thinner walled, finely reticulate carpels, and leaves unlobed, only one-third to one-half as wide as long; and from subspecies *arida* in having much narrower leaves. Eastern Riverside County, California, to Arizona and Nevada. Type locality: St. Thomas, Nevada.

Sphaeralcea Emoryi subsp. *arida* (Rose) Kearney, Univ. Calif. Pub. Bot. 19: 41. 1935. (*Sphaeralcea*

arida Rose, Contr. U.S. Nat. Herb. 5: 177. 1899.) Differs from the other forms of *Emoryi* in having the indehiscent part of the carpel distinctly narrower than the dehiscent part; usually glabrous seeds; and shorter, broader leaves. Southeastern California to southern Nevada and through Arizona and Sonora to Sinaloa. Type locality: Guaymas, Sonora.

4. *Sphaeralcea ambigua* A. Gray. Desert-mallow or Desert-hollyhock. Fig. 3171.

Sphaeralcea Emoryi A. Gray in Ives Rep. 8. 1860. Not Torrey, 1849.

Sphaeralcea ambigua A. Gray, Proc. Amer. Acad. 22: 292. 1887.

Sphaeralcea Macdougalii Rose & Standley, Contr. U.S. Nat. Herb. 16: 13. 1912.

Sphaeralcea ambigua var. *Keckii* Munz, Bull. S. Calif. Acad. 31: 68. 1932.

Suffrutescent with numerous erect stems 6–10 dm. high from a thick, woody crown, densely white- or yellowish-canescens throughout. Leaves thickish-rugose, prominently veined beneath, broadly ovate, deltoid, to nearly orbicular in outline, cordate at the base, rather shallowly 3-lobed near the middle, 1–6 cm. long, nearly to quite as broad, coarsely crenate to crenate-dentate; inflorescence open panicle or rarely narrowly thyrsoid; calyx 6–20 mm. high, lobes lanceolate, attenuate-acuminate, 2–4 times as long as the tube; petals grenadine, 15–35 mm. long; fruit hemispherical, 6–12 mm. wide, usually not over half as high as broad; carpels with chartaceous walls, 3.5–6 mm. high, galeate, narrowly and deeply notched, dehiscent portion erect, prominently beaked, forming about two-thirds of the carpel; indehiscent portion prominently and coarsely reticulate, usually 2-seeded.

Dry rocky slopes and margins of sandy washes, Upper and Lower Sonoran Zones; Colorado and Mojave Deserts and the desert slopes of the Sierra Nevada in Inyo County, California, to Utah, Arizona, and northern Sonora and Lower California. Type locality: Big Canyon of the Colorado. April–July.

Sphaeralcea ambigua subsp. *rosacea* (Munz & Jtn.) Kearney, Univ. Calif. Pub. Bot. 19: 46. 1935. (*Sphaeralcea purpurea* Parish ex Jepson, Man. Fl. Pl. Calif. 635. 1925.) Petals purplish pink, drying violet; anthers usually purple instead of yellow or orange. Sandy washes and rocky hillsides of the Lower Sonoran Zone from Palm Springs to southwestern Arizona and northern Lower California. Type locality: Palm Springs, Riverside County, California.

Sphaeralcea ambigua subsp. *monticola* Kearney, Univ. Calif. Pub. Bot. 19: 47. 1935. (*Sphaeralcea pulchella* Jepson, Man. Fl. Pl. Calif. 635. 1925. Not Philippi, 1892.) Inflorescence narrowly thyrsoid; plant herbaceous above the crown; stems seldom over 5 dm. high; leaves 3 cm. or less in length, thin, not rugose. Rocky slopes of desert mountain ranges at elevations of 4,000 to 7,000 feet from eastern San Bernardino County, California, to west-central Nevada and Utah. Type locality: Panamint Mountains, Inyo County, California.

Sphaeralcea ambigua subsp. *rugosa* Kearney, Univ. Calif. Pub. Bot. 19: 49. 1935. Similar to subspecies *monticola* but pubescence yellowish instead of whitish; leaves rugose, thick; carpels finely reticulate. Sandy soil, southern San Bernardino County southward along the western edge of the Colorado Desert, California, into northern Lower California. Type locality: Idyllwild, San Jacinto Mountains, Riverside County, California.

Sphaeralcea ambigua var. *aculeata* Jepson, Fl. Calif. 2: 503. 1936. Leaves ovate-oblong, subhastately 3-lobed, the middle lobe much longer than the lateral ones; carpels 6–8 mm. long. Western and central Mojave Desert, California. Type locality: West Palmdale, Los Angeles County.

5. *Sphaeralcea Rúsbyi* supsp. *eremicola* (Jepson) Kearney. Rusby's Desert-mallow. Fig. 3172.

Sphaeralcea eremicola Jepson, Man. Fl. Pl. Calif. 635. 1925.

Sphaeralcea Rusbyi subsp. *eremicola* Kearney, Univ. Calif. Pub. Bot. 19: 56. 1935.

Several erect or ascending stems 5–8.5 dm. high from a heavy, woody crown, sparsely pubescent throughout or glabrate in age. Leaves thin, broadly ovate, deltoid, to nearly orbicular, cordate at the base, 1.5–3 cm. long, pedately 5-parted or divided, the divisions cuneate-obovate to oblanceolate, few-cleft or coarsely toothed; inflorescence a few-flowered thyrses or panicle; calyx more densely pubescent than the leaves, 11–14 mm. long, the lobes lanceolate to deltoid, acuminate, about 3 times as long as the tube; petals grenadine, 10–20 mm. long; fruit truncate-ovoid, about half as high as the calyx; carpels shallowly and broadly notched, dehiscent portion erect, obtuse and mucous at the apex, indehiscent portion forming about one-fifth to two-fifths of the carpel, finely and faintly reticulate.

Desert slopes, Upper Sonoran Zone; known only from the type locality, Emigrant Canyon, Panamint Mountains, Inyo County, at an altitude of 4,200 feet. April–May.

6. *Sphaeralcea angustifolia* var. *cuspidata* A. Gray. Narrow-leaved Desert-mallow. Fig. 3173.

Sida stellata Torr. Ann. Lyc. N.Y. 2: 171. 1828. Not Cav. 1790.

Sphaeralcea stellata Torr. & Gray, Fl. N. Amer. 1: 228. 1838.

Malva stellata D. Dietr. Syn. Pl. 4: 816. 1847.

Sphaeralcea angustifolia var. *cuspidata* A. Gray, Proc. Amer. Acad. 22: 293. 1887.

Sphaeralcea cuspidata Britt. in Britt. & Brown, Ill. Fl. 3: 519. 1898.

Suffrutescent, many erect simple or narrowly paniculate-branched stems 4–12 dm. high from the woody base, finely stellate-puberulent throughout when young, stems and upper surfaces of leaves glabrate in age. Leaves oblong-lanceolate, sometimes obscurely lobed at the base, crenulate, 2–7 cm. long; flowers in few-flowered axillary clusters; calyx 5–6 mm. high, the lobes ovate, acuminate; petals emarginate, 8–12 mm. long, saffron-red; carpels 4–6 mm. high, 1–3-seeded, cuspidate, smooth and scarious above, reticulate opposite the lower seed.

Sandy desert washes, Lower and Upper Sonoran Zones; rare in California (Indio, Desert Center) and at Santa Monica, where it is probably introduced, and Arizona to Colorado, Texas, and Coahuila. Type locality: sources of the Arkansas River. Aug.–Oct.



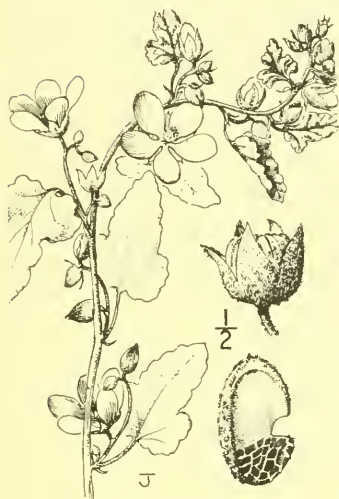
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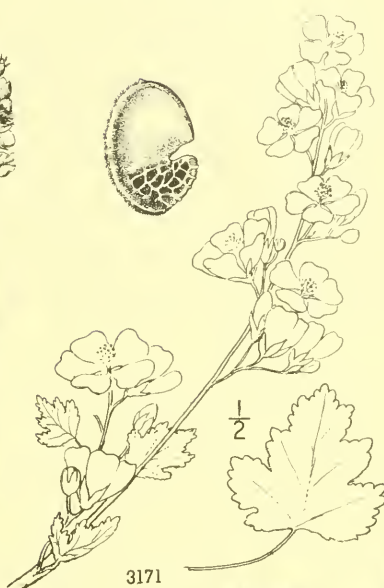
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3167. *Iliamna Bakeri*
 3168. *Sphaeralcea Orcuttii*
 3169. *Sphaeralcea Coulteri*

3170. *Sphaeralcea Emoryi*
 3171. *Sphaeralcea ambigua*
 3172. *Sphaeralcea Rusbyi*

3173. *Sphaeralcea angustifolia*
 3174. *Sphaeralcea parvifolia*
 3175. *Sphaeralcea Munroana*

7. *Sphaeralcea parvifolia* A. Nels. Small-leaved Desert-mallow. Fig. 3174.

Sphaeralcea parvifolia A. Nels. Proc. Biol. Soc. Wash. 17: 94. 1904.

Sphaeralcea marginata York ex Rydb. Bull. Torrey Club 33: 145. 1906.

Sphaeralcea arizonica Heller ex Rydb. Bull. Torrey Club 40: 59. 1913.

Perennial from a woody taproot, whitish-canescens throughout, stems several, erect, 5–10 dm. high. Leaves prominently veined beneath, thick, ovate-deltoid to suborbicular, cordate to truncate at the base, 1.5–4 cm. long, usually shallowly 3-lobed near the middle, crenate; inflorescence narrowly thyrsoid-glomerate, 10–30 cm. long; calyx 4–8 mm. high, densely pubescent, lobes ovate-lanceolate, short-acuminate; petals grenadine, 10–18 mm. long; fruit hemispherical to truncate-conical, slightly surpassing the calyx; carpels 3–5 mm. high, walls chartaceous, the dehiscent portion erect, ovate, mucronate or short-cuspidate, the indehiscent portion 1–1.5 mm. high, finely reticulate, usually 2-seeded.

Dry slopes, mesas, and openings in pine forests, Upper Sonoran and Arid Transition Zones; Inyo County, California, to Wyoming, Colorado, New Mexico, and central Arizona. Type locality: Caliente, Lincoln County, Nevada. Aug.–Oct.

8. *Sphaeralcea Munroana* (Dougl.) Spach. Munroe's Desert-mallow. Fig. 3175.

Malva Munroana Dougl. in Lindl. Bot. Reg. 16: pl. 1306. 1830.

Nuttallia Munroana Nutt. Journ. Acad. Phila. 7: 16. 1834.

Malvastrum Munroanum A. Gray, Mem. Amer. Acad. II. 4: 21. 1849.

Sphaeralcea Munroana Spach ex A. Gray, Proc. Amer. Acad. 22: 292. 1887.

Malveopsis Munroanum Kuntze, Rev. Gen. Pl. 1: 86. 1891.

Suffrutescent, stems 1 to several, erect or ascending, 3–8 dm. high, ashy pubescent throughout, or glabrate below. Leaves ovate to orbicular, 1–3.5 cm. long and broad, cordate to truncate at base, 3-lobed, the lobes rounded to acute; inflorescence thyrsoid-paniculate, compact, of few-flowered axillary clusters; calyx 4–5 mm. long, densely stellate-pubescent, the lobes ovate-acute; petals 9–12 mm. long, brick-red; fruit depressed-globose, 6–8 mm. broad, 4 mm. high; carpels oval-reniform, 1–2-seeded, densely stellate-pubescent on back, reticulate on sides below, smooth above, obtuse at the apex.

Sagebrush plains, Upper Sonoran and Arid Transition Zones; British Columbia south through eastern Washington and Oregon to Inyo County, California, and east to Montana, Wyoming, and Utah. Type locality: plains of the Columbia. Aug.–Oct.

Sphaeralcea Munroana subsp. *subrhomboides* (Rydb.) Kearney, Univ. Calif. Pub. Bot. 19: 85. 1935. (*Sphaeralcea subrhomboides* Rydb. Bull. Torrey Club 40: 59, 60. 1913.) Leaves cleft more than halfway to the midrib, or even 3-parted, subcuneate at the base. Eastern Oregon to Utah and Wyoming. Type locality: Wasatch County, Utah.

9. *Sphaeralcea grossulariaefolia* (Hook. & Arn.) Rydb. Currant-leaved Desert-mallow. Fig. 3176.

Sida grossulariaefolia Hook. & Arn. Bot. Beechey 326. 1840.

Malvastrum grossulariaefolia A. Gray, Mem. Amer. Acad. II. 4: 21. 1849.

Malvastrum coccineum var. *grossulariaefolium* Torr. in Stansbury Exp. 384. 1852.

Sphaeralcea pedata A. Gray (in part), Proc. Amer. Acad. 22: 291. 1887. Not Torr. 1849.

Sphaeralcea grossulariaefolia Rydb. Bull. Torrey Club 40: 58. 1913.

Perennial from a woody taproot and crown, with few erect or ascending stems 5–11 dm. high, whitish-canescens throughout. Leaves deltoid to broadly ovate in outline, usually cordate at the base, 2–4.5 cm. long, pedately deeply cleft or parted, the divisions usually again parted, coarsely and irregularly toothed; inflorescence thyrsoid-glomerate; calyx 5–10 mm. high, the lobes ovate-lanceolate, acuminate; petals grenadine, 8–20 mm. long; fruit hemispherical, 5–8 mm. wide; carpels 2.5–3.5 mm. high, nearly orbicular in outline, shallowly and narrowly notched, dehiscent portion erect or nearly so, broadly deltoid-ovate, obtuse at the apex, indehiscent part forming about one-half the carpel, finely reticulate.

Dry plains and hillsides, Upper Sonoran and Arid Transition Zones; south-central Washington and Idaho south to Lassen County, California, and east to Utah. Type locality: Bannock River, Power County, Idaho. Aug.–Oct.

Sphaeralcea grossulariaefolia subsp. *pedata* (Torr.) Kearney, Univ. Calif. Pub. Bot. 19: 88. 1935. (*Sphaeralcea pedata* Torr. in A. Gray, Mem. Amer. Acad. II. 4: 23. 1849.) Carpels broadly ovate in outline, three-fifths to three-fourths as wide as high, acute at the apex, often mucronate or even cuspidate. Eastern Oregon to Utah, Arizona, and New Mexico. Type locality: "Moving Fork, 1st Camp, Utah." Collected by Fremont's Expedition in 1845–47.

6. *MALVÁSTRUM* A. Gray, Mem. Amer. Acad. II. 4: 21. 1849.

Herbs and shrubs with simple, orbicular, angular, or lobed leaves, more or less stellate-pubescent throughout. Leaves alternate. Inflorescence capitate, interrupted-spicate, or paniculate, few- to many-flowered. Involucellate bractlets 1–3, or rarely wanting. Flowers perfect, white, pink, or rose-purple. Staminal column antheriferous at the summit. Style-branches filiform; stigmas capitate. Fruit depressed-globose or discoid, pubescent at the summit, at least when young. Carpels several, 1-ovuled, dehiscent; seeds ascending, irregularly minutely puberulent, filling the carpel; embryo curved. [Name coined by De Candolle, meaning False Mallow.]

A genus of over 100 species, distributed in the temperate and subtropical regions of North and South America, South Africa, and Australia. Type species, *Sida tricuspidata* DC.

Involucellate bractlets inconspicuous, equaling the calyx-tube or shorter.

Pubescence on apex of carpels of erect, stellate hairs, harsh, at least near the base of the style, not appressed-horizontal.

Calyx constricted at apex of the tube; lobes of leaves acute.

1. *M. Hallii*.

Calyx not constricted; lobes of leaves rounded or obtuse.

Inflorescence interrupted-spicate; inner surface of calyx-lobes glabrous; pubescence of calyces long, hirsute.

2. *M. orbiculatum*.

Inflorescence paniculate; inner surface of calyx-lobes tomentose, at least near the apex; calyces pubescent with short-rayed hairs.

Leaves cordate, thick; inflorescence many-flowered, pyramidal; pubescence harsh.

3. *M. Davidsonii*.

Leaves truncate or cuneate at the base, thin; inflorescence narrowly racemose-paniculate; pubescence velvety.

4. *M. Jonesii*.

Pubescence on carpels of appressed, horizontally spreading stellate hairs.

Buds broadly ovoid; calyces broadly campanulate at anthesis; pubescence fine or coarse, but the central rays erect.

Pubescence on calyces uniform, short-rayed; leaves thin, not rugulose; petioles slender, 1 mm. thick or less.

5. *M. fasciculatum*.

Pubescence on calyces of coarse, long-rayed and finer, short-rayed hairs; petioles stout.

6. *M. arcuatum*.

Buds oblong; calyces narrowly campanulate to nearly cylindrical at anthesis; pubescence minute, of fine-rayed, horizontally appressed stellate hairs.

7. *M. nesioticum*.

Involucellate bractlets conspicuous, about equaling or surpassing the calyx-lobes.

Inflorescence capitate; involucellate bractlets ovate to suborbicular.

8. *M. Palmeri*.

Inflorescence not capitate; bractlets linear to lanceolate.

Buds distinctly plicate-angled; bractlets ovate-lanceolate.

Inflorescence interrupted-spicate; floral bracts 1-3-dentate; inner surface of calyx-lobes tomentose to base.

9. *M. aboriginum*.

Inflorescence paniculate; floral bracts simple; calyx-lobes tomentose only on upper half of inner surface.

10. *M. Abbottii*.

Buds not plicate-angled; bractlets linear or setaceous.

Pubescence of the inflorescence thick-lanate, obscuring the calyx-lobes; buds globose; leaves densely and nearly equally stellate-pubescent on both sides.

11. *M. Fremontii*.

Pubescence of the inflorescence harsh or fine, but not obscuring the calyx-lobes; buds ovoid to ovoid-acuminate; leaves more densely pubescent beneath than above.

Calyces clothed with simple, purplish glandular hairs intermingled with the stellate-pubescent; inflorescence divaricately paniculate.

12. *M. gracile*.

Calyces without coarse glandular hairs; inflorescence interrupted-spicate.

Upper surface of leaves sparsely pubescent to glabrate; inflorescence silky white-tomentose.

13. *M. clementinum*.

Upper surface of leaves moderately stellate-pubescent, not glabrate; pubescence harsh, tawny, not white nor silky.

Stipules 4-8 mm. long; leaves more or less 3-5-lobed, the margins irregularly crenate.

Leaves not rugose; calyces hirsute, the lobes acuminate; stipules 4-5 mm. long.

14. *M. densiflorum*.

Leaves strongly rugose; calyces harshly stellate-pubescent, not hirsute; stipules 5-8 mm. long.

15. *M. arcuatum*.

Stipules 10-12 mm. long; leaves scarcely at all lobed, the margins serrate-dentate.

16. *M. marruboides*.

1. *Malvastrum Hallii* Eastw. Hall's *Malvastrum*. Fig. 3177.

Malvastrum Hallii Eastw. Leaflets West. Bot. 1: 216. 1936.

Sphaeralcea fasciculata var. *Elmeri* Jepson, Fl. Calif. 2: 501. 1936.

Erect shrub 1-2 m. high with long slender branches, densely canescent with fine, short-rayed stellate hairs. Leaves ovate to suborbicular, irregularly crenate, shallowly 3-5-lobed, broadly cuneate to shallowly cordate at the base, 1-6 cm. long, rugulose, paler and prominently veined beneath; petioles stout; stipules lance-subulate, 5-8 mm. long; inflorescence paniculate; pedicels 2-6 mm. long; involucellate bractlets linear, 1.5-3 mm. long; calyx campanulate, often slightly constricted at the apex of the tube, 4-5.5 mm. long, the lobes deltoid, 2 mm. wide, 2-2.5 mm. long, densely stellate-canescens; petals 10-15 mm. long, pink to rose; staminal column slender, glabrous, half as long as the petals; carpels 2.5-3 mm. high, densely stellate-pubescent on the summits and about one-third the way down the backs with erect, bristly, several-rayed hairs and intermingled with a few smaller, appressed stellate hairs; seeds ovate-reniform, 2 mm. high, dark brown, sparsely and irregularly puberulent.

Stony south slopes and canyon sides, Upper Sonoran Zone; Inner Coast Ranges from Mount Diablo to the vicinity of Pacheco Pass, Santa Clara County, California. Type locality: west side of Mount Diablo north of Pine Canyon, Contra Costa County, California. May-Aug.

Malvastrum mendocinense Eastw. Leaflets West. Bot. 2: 188. 1939. Leaves somewhat broader, the pubescence more tawny, and the calyx-tube scarcely or not at all constricted, may be conspecific with or a variety of *M. Hallii*. Between Ukiah and Booneville, Mendocino County. June-July.

2. *Malvastrum orbiculatum* Greene. Round-leaved *Malvastrum*. Fig. 3178.

Malvastrum orbiculatum Greene, Fl. Fran. 109. 1891.

Malacothamnus orbiculatus Greene, Leaflets Bot. Obs. 1: 208. 1906.

Malvastrum Fremontii var. *orbiculatum* I. M. Johnston, Pl. World 22: 109. 1919.

Sphaeralcea orbiculata Jepson, Fl. Calif. 2: 499. 1936.

Suffrutescent, stout erect branches 1-2 m. high, densely stellate-tomentose throughout with

tawny slender-rayed hairs. Leaves orbicular-cordate, the upper often 3-5-lobed, coarsely crenate, 2-6 cm. long and broad, veins more coarsely scurfy-pubescent on the under surface; petioles stout, 3-18 mm. long; stipules thin, subulate, 4-5 mm. long; inflorescence interrupted-spicate or of short-pedunculate axillary clusters; involuclate bractlets linear-lanceolate, 4-6 mm. long, shorter than the calyx-lobes; calyx densely tomentose with long-rayed stellate hairs, 7-10 mm. long, the lobes triangular-lanceolate, 3-7 mm. long, 2-4 mm. wide; petals obovate, rose-pink, 10-12 mm. long; staminal column glabrous; carpels obovate-reniform, about 2 mm. high, densely stellate-pubescent with bright yellow hairs on the summits, glabrous on the backs and sides; seeds reniform, black, minutely stellate-puberulent.

Dry slopes, Upper Sonoran Zone; bordering the desert from the Tehachapi Mountains of Kern and Ventura Counties and the eastern slope of the southern Sierra Nevada in Inyo County to the San Bernardino Mountains, California. Type locality: mountains south of Tehachapi, Kern County, California. June-Oct.

3. *Malvastrum Davidsonii* Robinson. Davidson's *Malvastrum*. Fig. 3179.

Malvastrum Davidsonii Robinson in A. Gray, Syn. Fl. N. Amer. 1: 312. 1897.

Malacothamnus Davidsonii Greene, Leaflets Bot. Obs. 1: 208. 1906.

Sphaeralcea Davidsonii Jepson, Man. Fl. Pl. Calif. 634. 1925.

An arborescent shrub 2-5 m. high with coarse branches, leaves and inflorescence scurfy with a coarse, thick, stellate tomentum. Leaves thick, orbicular to pentagonal, usually shallowly 3-5-lobed, 2-10 cm. wide and long, cordate, irregularly dentate or crenate, somewhat rugose, both surfaces stellate-tomentose, veiny beneath; petioles stout, 1-4 cm. long; inflorescence a pyramidal panicle and with short-pedunculate clusters of flowers in the axils of the upper leaves; pedicels stout, 0.5-1 cm. long; involuclate bractlets lance-linear, 3-5 mm. long, about equaling the calyx-tube; calyx 5-8 mm. long, the lobes ovate, 2-4 mm. long, acute, sometimes mucronate; petals rose-pink, 8-12 mm. long; staminal column 3-6 mm. long; carpels 2-2.5 mm. high, stellate-pubescent on the summits, glabrous on the backs and sides; seeds ovate-reniform, irregularly stellate-puberulent, the surface finely reticulate.

Dry washes, Upper Sonoran Zone; San Fernando Valley below 2,000 feet altitude, Los Angeles County, California. Type locality: San Fernando Valley, Los Angeles County, California. July-Nov.

4. *Malvastrum Jonesii* Munz. Jones's *Malvastrum*. Fig. 3180.

Malvastrum Jonesii Munz, Bull. S. Calif. Acad. 24: 88. 1925.

Malvastrum Dudleyi Eastw. Leaflets West. Bot. 1: 218. 1936.

Sphaeralcea fasciculata var. *Jonesii* Jepson, Fl. Calif. 2: 501. 1936.

An openly branching shrub with dense stellate-canescient branchlets and herbage. Leaves rhomboidal-ovate to suborbicular, truncate to cuneate at the base, irregularly crenate above the base, scarcely lobed, 1.5-5 cm. long, prominently veined beneath; petioles 1-2.5 cm. long; stipules lance-subulate, 4-6 mm. long; inflorescence racemose-paniculate, 10-30 cm. long; involuclate bractlets linear-setaceous, 3-4 mm. long; pedicels stout, 2-7 mm. long; calyx broadly campanulate, densely canescient-tomentose, 6-8.5 mm. long, the lobes ovate, acute, 3-3.5 mm. wide, 4-5 mm. long; petals 10-14 mm. long, oblong, rose-colored; staminal column about two-thirds as long as the petals; carpels reniform-ovoid, 2.5-3 mm. high, pubescent over the summit when young, glabrate except on the angles and about base of style in age; seeds black or dark brown, 2-2.5 mm. high, minutely puberulent in irregular patches.

Hillsides and in chaparral, Upper Sonoran Zone; Santa Lucia Mountains in southern Monterey County to the vicinity of Paso Robles, San Luis Obispo County, California. Type locality: Paso Robles, California. April-July.

5. *Malvastrum fasciculatum* (Nutt.) Greene. Mesa *Malvastrum*. Fig. 3181.

Malva fasciculata Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 225. 1838.

Malvastrum Thurberi A. Gray, Mem. Amer. Acad. II. 5: 307. 1854.

Malveopsis fasciculata Kuntze, Rev. Gen. Pl. 1: 72. 1891.

Malvastrum fasciculatum Greene, Fl. Fran. 108. 1891.

Malacothamnus fasciculatus Greene, Leaflets Bot. Obs. 1: 208. 1906.

Sphaeralcea fasciculata Arthur, Torrey 21: 11. 1921.

Openly branched shrub, 1-3 m. high with flexuous, sparingly leaved branches, finely stellate-pubescent on young herbage, bark becoming smooth and gray in age. Leaves broadly pentagonal, shallowly 3-5-lobed, crenate, 1-6 cm. long and broad, truncate to subcordate at base, green above, stellate-canescient beneath; petioles slender, 0.5-2 cm. long; stipules setaceous, 2-4 mm. long; inflorescence interrupted-spicate, often virgate, the flowers in ebracteate clusters and in the axils of the upper leaves; involuclate bractlets setaceous, shorter than the calyx-tube; calyx 6-8 mm. long, finely scurfy-stellate, the lobes ovate, acute, 3-4 mm. long; petals 12-20 mm. long, deep rose; carpels ovate, 2.5-3 mm. high, appressed stellate-puberulent on the summit and one-fourth the way down the back, glabrate in age; seeds dark brown, irregularly and finely stellate-puberulent.

Foothills and lower mountains, Upper Sonoran Zone; west of the divide from Tehachapi Mountains, California, south into northern Lower California. Type locality: probably near San Diego, California. Jan.-July.

Malvastrum fasciculatum var. *laxiflorum* (A. Gray) Munz & Jtn. Bull. Torrey Club 51: 296. 1924. (*Malvastrum Thurberi* var. *laxiflorum* A. Gray, Proc. Amer. Acad. 22: 291. 1887; *Sphaeralcea fasciculata* var. *laxiflora* Jepson, Man. Fl. Pl. Calif. 634. 1925; *Malvastrum Parishii* Eastw. Leaflets West. Bot. 1: 216. 1936.) Inflorescence lax, paniculately branching, pedicels and peduncles 1-5 cm. long, otherwise as in the species. Canyon sides and in chaparral from Ventura and western San Bernardino Counties south through Orange County, California, into northern Lower California. Type locality unknown.



3176



3177



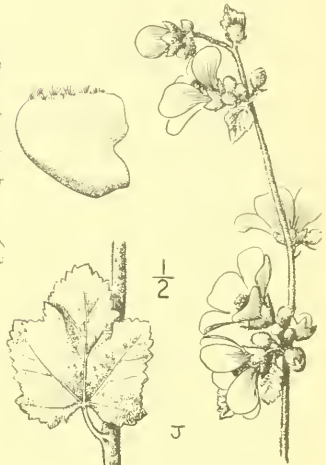
3178



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3176. *Sphaeralcea grossulariaefolia*
 3177. *Malvastrum Hallii*
 3178. *Malvastrum orbiculatum*

3179. *Malvastrum Davidsonii*
 3180. *Malvastrum Jonesii*
 3181. *Malvastrum fasciculatum*

3182. *Malvastrum arcuatum*
 3183. *Malvastrum nesioticum*
 3184. *Malvastrum Palmeri*

6. *Malvastrum arcuatum* (Greene) Robinson. Northern *Malvastrum*. Fig. 3182.

Malveopsis arcuata Greene, Man. Bay Reg. 66. 1894.

Malvastrum arcuatum Robinson in A. Gray, Syn. Fl. N. Amer. 1st: 311. 1897.

Malacothamnus arcuatus Greene, Leaflets Bot. Obs. 1: 208. 1906.

Sphaeralcea arcuata Arthur, Torreya 21: 11. 1921.

Erect shrub 1–2.5 m. high, densely stellate-tomentose throughout, the hairs appressed, white on stems and leaves, stramineous and slightly scurfy on the calyces. Leaves ovate, 1–4 cm. broad, 1.5–5 cm. long, obscurely 3–5-lobed, crenate, rugose, veiny and paler beneath; petioles stout, 0.5–2 cm. long; stipules lanceolate, 5–8 mm. long; inflorescence interrupted-spicate, somewhat secund, flowers sessile; involuclate bractlets linear-subulate, 5–8 mm. long, equaling or surpassing the calyx-tube; calyx obovate, 6–10 mm. long, densely stellate-pubescent; calyx-lobes ovate, acute to short-mucronate, 2–4 mm. long and broad; petals 15–20 mm. long, rose-colored; staminal column slender, about one-third to half as long as the petals, glabrous; carpels reniform-ovate, about 3 mm. high, closely appressed-stellate-pubescent on the summit and about one-third down the backs; seeds dark brown, irregularly stellate-puberulent, surface minutely tessellated.

Occasional on hillsides and dry ravines, Upper Sonoran Zone; San Mateo County to southern Santa Clara County, California. Type locality: eastern slopes of the Coast Range back of Belmont, San Mateo County. May–Sept.

7. *Malvastrum nesioticum* Robinson. Insular *Malvastrum*. Fig. 3183.

Malvastrum nesioticum Robinson in A. Gray, Syn. Fl. N. Amer. 1st: 312. 1897.

Malacothamnus nesioticus Abrams, Bull. N.Y. Bot. Gard. 6: 419. 1910.

Sphaeralcea nesiotica Jepson, Man. Fl. Pl. Calif. 634. 1925.

Sphaeralcea fasciculata var. *nesiotica* Jepson, Fl. Calif. 2: 501. 1936.

Malvastrum fasciculatum var. *nesioticum* McMinn, Ill. Man. Calif. Shrubs 348. 1939.

A much-branched shrub 1–2 m. high, stems, inflorescence, and lower surfaces of the leaves minutely but densely stellate-canescens. Leaves pentagonal, leathery, 3–5-lobed, cordate, 2–4.5 cm. long, green and glabrate above, densely fine-canescens beneath, irregularly crenate, margins often revolute; petioles stout, 5–15 mm. long; stipules ovate, 2–3 mm. long; inflorescence a rigid, ascending panicle, many-flowered; involuclate bractlets setaceous, 2–3 mm. long; calyx campanulate, 5–8 mm. long, finely but densely stellate-canescens, the lobes broadly ovate, 2–3 mm. long, 3–5 mm. wide at the base, abruptly acute, veiny at maturity; petals rose-pink, 10–15 mm. long, slightly clawed; staminal column about equaling the calyx-lobes; carpels obovate-reniform, 4 mm. high, stellate-puberulent on the summit; seeds irregularly covered with minute stellate puberulence.

Dry slopes and small canyons, Upper Sonoran Zone; Santa Cruz Island, Santa Barbara County, California. Type locality: "Island of Sta. Cruz." April–Aug.

Malvastrum nesioticum subsp. *Nuttallii* (Abrams) Wiggins. (*Malacothamnus Nuttallii* Abrams, Bull. N.Y. Bot. Gard. 6: 417. 1910; *Sphaeralcea fasciculata* var. *Nuttallii* Jepson, Fl. Calif. 2: 501. 1936.) Leaves equally pubescent on both surfaces, not revolute; calyx-lobes glabrous on the inner surface except at the very tip. Rocky hillsides and small gulches, Upper Sonoran Zone; Santa Barbara and Ventura Counties, California. Type locality: Casitas Pass, Ventura County, California.

8. *Malvastrum Palmeri* S. Wats. Palmer's *Malvastrum*. Fig. 3184.

Malvastrum Palmeri S. Wats. Proc. Amer. Acad. 12: 250. 1877.

Sphaeralcea Palmeri Jepson, Man. Fl. Pl. Calif. 633. 1925.

A stout leafy shrub 1–2.5 m. high, densely and coarsely stellate-tomentose throughout with scurfy, tawny hairs. Leaves broadly ovate to pentagonal, 5-lobed, 2–6 cm. broad, 2.5–7 cm. long, truncate to subcordate at the base, crenate-serrate, densely stellate-tomentose on both surfaces; petioles 1–3 cm. long; stipules ovate to lance-triangular, abruptly acuminate, 6–10 mm. long, sparsely pubescent; inflorescence of dense capitate terminal, usually solitary clusters, the flowers sessile, subtended by ovate, entire or 3-lobed foliaceous bracts; involuclate bractlets ovate-lanceolate, acuminate, equaling or exceeding the calyx-lobes; calyx densely stellate-pubescent, the lobes ovate, acute or short-acuminate, 2–4 mm. broad, 4–6 mm. long; petals obovate, emarginate or rounded at the summit, 10–14 mm. long, rose-colored; carpels obovate-reniform, 3–3.5 mm. high, stellate-pubescent on the summit, glabrous on the backs and sides.

Canyons and hillsides near the sea, Upper Sonoran Zone; in San Luis Obispo County, California. Type locality: Cambria, a mile from the sea, San Luis Obispo County. April–Aug.

Malvastrum Palmeri var. *involutum* (Robinson) McMinn, Ill. Man. Calif. Shrubs 339. 1939. (*Malvastrum involutum* Robinson in A. Gray, Syn. Fl. N. Amer. 1st: 310. 1897.) Differs from *M. Palmeri* in having leaves bright green and glabrate on the upper surface; entire, somewhat narrower bracts subtending the flowers; and the heads of the inflorescence denser and frequently several subterminal clusters below the terminal one. Hillsides and valleys in the Upper Sonoran Zone from Carmel Valley to Jolon, Monterey County, California. Type locality: Jolon, Monterey County.

9. *Malvastrum aboriginum* Robinson. Indian Valley *Malvastrum*. Fig. 3185.

Malvastrum aboriginum Robinson in A. Gray, Syn. Fl. N. Amer. 1st: 311. 1897.

Sphaeralcea aboriginum Jepson, Fl. Calif. 2: 498. fig. 240. 1936.

A stout shrub 1–1.5 m. high, with densely stellate-tomentose foliage and branches. Leaves ovate to orbicular, shallowly cordate and 3–5-lobed, irregularly dentate-crenate, 1.5–5 cm. long, nearly as broad to slightly wider, densely pubescent on both surfaces with short-rayed, tawny stellate hairs; petioles 0.5–3 cm. long, stout; stipules lance-ovate, 4–6 mm. long; inflorescence

interrupted-spicate, 1-3 dm. long, the flower-clusters subtended by reduced leaves or 3-dentate foliaceous bracts; involuclate bractlets broadly ovate, 6-10 mm. long; calyces 6-10 mm. long, moderately rugulose-veined, pale beneath; petioles 7-20 mm. long, slender; stipules lance-subulate, 4-5 mm. long; inflorescence a spreading panicle 3-5 dm. long, lateral branches often 15 cm. long; pedicels 1-4 mm. long, stellate-canescens; involuclate bractlets ovate-lanceolate, 1-2 mm. broad, 6-8 mm. long, purplish toward the tip; calyx ovoid-acuminate in bud, 7-8 mm. long, lobes ovoid-acuminate at anthesis, tomentose on the upper half on the inside; petals 12-15 mm. long, rose-colored; staminal column 5-6 mm. long, glabrous; fruits unknown.

On open rocky slopes, Upper Sonoran Zone; southern San Benito County and eastern Monterey County. Type locality: Indian Valley, Monterey County, California. June-Sept.

10. *Malvastrum Abbottii* Eastw. Abbott's *Malvastrum*. Fig. 3186.

Malvastrum Abbottii Eastw. Leaflets West Bot. 1: 215. 1936.

Slender shrub 1-2 m. high with finely stellate-canescens twigs, herbage and inflorescence. Leaves broadly ovate to suborbicular, truncate or subcordate at the base, crenate, 1.5-6 cm. long, moderately rugulose-veined, pale beneath; petioles 7-20 mm. long, slender; stipules lance-subulate, 4-5 mm. long; inflorescence a spreading panicle 3-5 dm. long, lateral branches often 15 cm. long; pedicels 1-4 mm. long, stellate-canescens; involuclate bractlets ovate-lanceolate, 1-2 mm. broad, 6-8 mm. long, purplish toward the tip; calyx ovoid-acuminate in bud, 7-8 mm. long, lobes ovoid-acuminate at anthesis, tomentose on the upper half on the inside; petals 12-15 mm. long, rose-colored; staminal column 5-6 mm. long, glabrous; fruits unknown.

Stream banks, Upper Sonoran Zone; known only from the type specimen, collected among willows on the Salinas River, Monterey County, California. Sept.-Oct.

11. *Malvastrum Fremontii* Torr. Fremont's *Malvastrum*. Fig. 3187.

Malvastrum Fremontii Torr. ex A. Gray, Mem. Amer. Acad. II. 4: 21. 1849.

Malveopsis Fremontii Greene, Erythraea 1: 171. 1890.

Sphaeralcea Fremontii Jepson, Man. Fl. Pl. Calif. 633. 1925.

Shrub 1-2.5 m. high, densely white stellate-tomentose. Leaves broadly ovate to suborbicular, truncate to subcordate, shallowly 3-7-lobed or crenate, 1.5-5 cm. long, rugose, prominently veined beneath; petioles 1-2.5 cm. long; stipules linear, 5-10 mm. long; inflorescence interrupted-spicate-glomerate; involuclate bractlets linear-setaceous, about equaling the calyx; calyx globose in bud, 6-10 mm. long, densely tomentose, the lobes acute, 3-4 mm. long, obscured by the thick wool; petals pink to rose-colored, 12-15 mm. long; staminal column stout, 6-7 mm. long; carpels ovate, 3-3.5 mm. high, coarsely stellate-pubescent on the summit in youth, soon glabrate; seeds dark brown, minutely and irregularly puberulent.

Foothill slopes and dry canyons, Upper Sonoran Zone; Inner Coast Ranges and west side of the Sierra Nevada, Colusa and Amador Counties to Tehachapi Pass, California. Type locality: "Interior of California." May-Sept.

Malvastrum Fremontii var. *cercophorum* Robinson in A. Gray, Syn. Fl. N. Amer. 1: 311. 1897. (*Malvastrum Howellii* Eastw. Leaflets West Bot. 1: 220. 1936; *Malvastrum Howellii* var. *cordatum* Eastw. loc. cit.; *Sphaeralcea Fremontii* var. *cercophorum* Jepson, Fl. Calif. 2: 500. 1936.) Tips of calyx-lobes erect in bud, lanceolate-acuminate, 6-10 mm. long, nearly or quite equaling the petals. Dry hillsides and arroyos, eastern slopes of the Inner Coast Ranges, from Contra Costa County to western Stanislaus County, California. Type locality: Arroyo del Valle, Alameda County.

Malvastrum Fremontii subsp. *exfibulosum* (Jepson) Wiggins. (*Sphaeralcea Fremontii* var. *exfibulosa* Jepson, Fl. Calif. 2: 500. 1936; *Malvastrum Helleri* Eastw. Leaflets West Bot. 1: 217. 1936.) Leaves broadly cuneate at the base, the lobes acute instead of rounded, coarsely and irregularly dentate, scarcely at all rugose above. Dry hillsides, Upper Sonoran Zone; northwestern Colusa County, and adjacent Lake County south to western Yolo County, California. Type locality: near Winters, Yolo County.

Malvastrum Fremontii var. *niveum* (Eastw.) McMinn, Ill. Man. Calif. Shrubs 343. 1939. (*Malvastrum fragrans* Eastw. Leaflets West Bot. 1: 218. 1936. Not *M. fragrans* Harv. & Gray, 1859-60; *Malvastrum niveum* Eastw. op. cit. 232.) Stipules setaceous, 3-4 mm. long; leaves 2 cm. or less in width; inflorescence paniculate. In chaparral, Inner Coast Ranges, central San Luis Obispo County to northern Santa Barbara County, California. Type locality: near Santa Margarita, San Luis Obispo County.

12. *Malvastrum gracile* Eastw. Slender *Malvastrum*. Fig. 3188.

Malvastrum gracile Eastw. Leaflets West Bot. 1: 219. 1936.

Shrub 1-2 m. high, felty-tomentose on new growth. Leaves broadly ovate, shallowly 3-lobed, crenate, truncate or obtusely rounded at the base, obtuse at the apex, faintly veined and pale green above, ashy and prominently 5-veined beneath, 1-3 cm. long; stipules minute, subulate-setaceous, 1.5-3 mm. long, purplish; inflorescence paniculate, 15-30 cm. long; pedicels stout, 0.5-4 mm. long; calyx broadly obturbinate and 5-7 mm. long, felty-stellate, nearly white at the base, purplish toward the apex with purplish glandular hairs among stellate hairs, lobes narrowly short-acuminate, 3-4 mm. long; involuclate bractlets filiform, about equaling the calyx, purplish; petals 10-15 mm. long, oblong, rose-colored; staminal column glabrous, 8 mm. long; carpels 2 mm. high, ovate-reniform, stellate-puberulent on the summit, glabrate on the back.

Hillsides, Upper Sonoran Zone; central San Luis Obispo County, California. Type locality: between Arroyo Grande and Huasna, San Luis Obispo County. June-July.

13. *Malvastrum clementinum* Munz & Jtn. San Clemente *Malvastrum*.

Fig. 3189.

Malvastrum clementinum Munz & Jtn. Bull. Torrey Club 51: 296. 1924.

Sphaeralcea orbiculata var. *clementina* Jepson, Fl. Calif. 2: 499. 1936.

Shrub 1-2.5 m. high, the stems white-tomentose with soft, silky stellate hairs when young. Leaves ovate or pentagonal, shallowly 3-5-lobed, cordate, 3-5 cm. long and broad, irregularly

crenate, bright green, with few sparse long-rayed, slender stellate hairs on the upper surface, densely soft-stellate-tomentose and veiny beneath; petioles stout, woolly, 1.5–2.5 cm. long; stipules scarious, subulate, 8–12 mm. long; inflorescence interrupted-spicate, 2–4 dm. long, the flowers subsessile in white-woolly clusters; involucellate bractlets filiform, conspicuous, equaling the calyx-lobes; calyx 6–7 mm. long, white-tomentose, the lobes ovate-lanceolate, acute, 4–5 mm. long; petals pink, oblong-obovate, 12–18 mm. long; staminal column slender, 5–6 mm. long; carpels 2.5–3 mm. high, stellate-pubescent over whole summit when young, glabrous in age; seeds 1.8 mm. high, short-puberulent.

Known only from the vicinity of the type locality on San Clemente Island. Type locality: canyon above Lemmon Tank, San Clemente Island, California. April–July.

14. *Malvastrum densiflorum* S. Wats. Many-flowered Malvastrum. Fig. 3190.

Malvastrum densiflorum S. Wats. Proc. Amer. Acad. 17: 368. 1882.

Sphaeralcea densiflora Jepson, Man. Fl. Pl. Calif. 633. 1925.

Suffrutescent, 1–2 m. high, with scurfy, short-rayed stellate pubescence throughout. Leaves broadly ovate to orbicular, shallowly 3–5-lobed, shallowly cordate to broadly cuneate at the base, irregularly dentate-crenate to serrate, 2–4 cm. long, 1.5–3.5 cm. wide, sparsely stellate above, more densely so and prominently veined beneath; petioles 0.5–2 cm. long; inflorescence interrupted-spicate, flowers sessile, crowded; involucellate bractlets conspicuous, linear, 8–18 mm. long, equaling or exceeding the calyx-lobes; calyx ovoid, deeply cleft, stellate-pubescent with hairs much longer than those of the leaves and stems, the lobes lance-ovate, acuminate, 10–15 mm. long; petals 10–15 mm. long, rose-pink; carpels 2 mm. high, stellate-pubescent on the upper surface, glabrous on the backs and sides.

Dry slopes in chaparral, Upper Sonoran Zone; Orange and Riverside Counties to San Diego County, California, and northern Lower California. Type locality: Agua Caliente (Palm Springs), Riverside County, California. March–July.

Malvastrum densiflorum var. *viscidum* (Abrams) Estes, Bull. S. Calif. Acad. 24: 85. 1925. (*Malvastrum viscidum* Abrams, Bull. Torrey Club 34: 264. 1907; *Sphaeralcea densiflora* var. *viscida* Jepson, Fl. Calif. 2: 498. 1936.) Differs from the typical plant in having calyx-lobes only 3–7 mm. long, correspondingly shorter bractlets, and leaves usually viscid-glandular on the upper surface. Southern San Diego County, California, into northern Lower California. Type locality: El Nido, San Diego County, California.

15. *Malvastrum marrubioides* Dur. & Hilg. Foothill Malvastrum. Fig. 3191.

Malvastrum marrubioides Dur. & Hilg. Journ. Acad. Phila. II. 3: 38. 1854.

Malacothamnus marrubioides Greene, Leaflets Bot. Obs. 1: 208. 1906.

Malvastrum gabrielense Munz & Jtn. Bull. Torrey Club 52: 223. 1925.

Sphaeralcea densiflora var. *gabrielensis* Jepson, Fl. Calif. 2: 498. 1936.

Shrub 1–2 m. high with slender virgate branches and moderately dense, fine-rayed stellate pubescence. Leaves ovate to suborbicular, 2–4.5 cm. long, serrate-dentate, truncate to subcordate at the base, green above, paler and conspicuously veined beneath; petioles 5–15 mm. long; stipules 9–12 mm. long, linear-subulate; inflorescence interrupted-spicate; pedicels 1–4 mm. long; bractlets linear-subulate, 8–12 mm. long; calyx 10–12 mm. long, loosely stellate-pubescent, the lobes lance-ovate, 3–3.5 mm. wide, 7–9 mm. long, acuminate, densely white-tomentose to base of the lobes within; petals rose-colored, 15–18 mm. long; staminal column 10–12 mm. long; carpels cochleate-reniform, 2–2.5 mm. high and wide, puberulent with erect-rayed stellate hairs over entire summit, glabrous on the back; seeds dark brown, irregularly puberulent.

Dry hillsides, Upper Sonoran Zone; Fort Miller, Fresno County, north slopes of San Gabriel Mountains, Los Angeles County, California. Type locality: Fort Miller, Fresno County, California. July–Oct.

7. EREMÁLICHE Greene, Leaflets Bot. Obs. 1: 208. 1906.

Low annual herbs with alternate orbicular or palmately parted leaves, stellate-pubescent throughout. Involucellate bractlets 3, distinct, persistent. Flowers solitary or in pairs in the axils of the upper leaves. Petals white to rose-purple, hairy along the margins of the claws. Staminal column simple, glabrous. Style-branches from one and a half to two times as long as the staminal column, filiform, as many as the carpels; stigmas capitate. Fruit discoid. Carpels 10–40, 1-ovulate, indehiscent, reticulate or transversely ridged on the back and angles, glabrous. One seed in each carpel, completely filling the cavity. Embryo forming an incomplete circle; endosperm scanty, oily. [Name Greek, referring to the desert habitat.]

A genus of 4 species of the southwestern United States and adjacent Mexico. Type species, *Malvastrum rotundifolium* A. Gray.

Leaves reniform-orbicular, crenate; carpels strongly reticulate dorsally and laterally, flattened laterally, the angles acute. 1. *E. rotundifolia*.

Leaves palmately 3–5-lobed; carpels less strongly flattened laterally, transversely ridged, scarcely reticulate, angles rounded.

Calyx-lobes ovate, abruptly short-acuminate; inflorescence hispidulous, hairs coarse, 10–20-rayed; corolla rose to rose-purple; mature carpels stramineous. 2. *E. Parryi*.

Calyx-lobes lance-attenuate; inflorescence puberulent, hairs slender, 3–8-rayed; corolla creamy white; mature carpels brown or grayish.

Petals 10–12 mm. long; pubescence of leaves of 5–7-rayed hairs; carpels gray to light brown.

Petals 2–5 mm. long; pubescence of leaves of 3–5-rayed hairs; carpels dark brown. 3. *E. kernensis*.

4. *E. exilis*.

1. *Eremalche rotundifolia* (A. Gray) Greene. Desert Five-spot. Fig. 3192.

Malvastrum rotundifolium A. Gray, Proc. Amer. Acad. 7: 333. 1868.

Eremalche rotundifolia Greene, Leaflets Bot. Obs. 1: 208. 1906.

Sphaeralcea rotundifolia Jepson, Man. Fl. Pl. Calif. 633. 1925.

Erect annual 1-3 dm. high; stems sparsely hispid. Leaves orbicular-cordate, crenate, 1-4 cm. broad, sparsely stellate-hispid; petioles 1-8 cm. long, sparsely hispid; stipules triangular-lanceolate, 3-4 mm. long; flowers axillary, solitary or in pairs; pedicels slender, 2-6 cm. long; involucellate bractlets linear-lanceolate, 5-10 mm. long; calyx densely and finely stellate-pubescent, the lobes broadly ovate-lanceolate, 4-6 mm. broad, 8-12 mm. long, acuminate; petals obovate, 10-25 mm. long, rose-purple, with a crimson spot near the base; fruit discoid, 10-15 mm. broad; carpels 20-40, orbicular, strongly flattened laterally, 3-3.5 mm. in diameter, dark brown to black, angles acute.

Sandy soil, Lower Sonoran Zone; Inyo County through the Mojave and Colorado Deserts, California, to southwestern Arizona and northern Lower California. Type locality: Fort Mojave. Feb.-June.

2. *Eremalche Parryi* Greene. Parry's Mallow. Fig. 3193.

Malvastrum Parryi Greene, Fl. Fran. 108. 1891.

Eremalche Parryi Greene, Leaflets Bot. Obs. 1: 208. 1906.

Sphaeralcea Parryi Jepson, Man. Fl. Pl. Calif. 633. 1925.

Erect or decumbent annual, finely stellate-pubescent throughout, stems 1-3 dm. long. Leaves 1-2 cm. broad, palmately 3-5-lobed, the lobes irregularly 3-7-toothed; petioles slender, 1-3.5 cm. long; stipules linear-subulate, 2-4 mm. long; flowers polygamo-dioecious, solitary, the pistillate smaller and darker than the staminate; pedicels 3-6 cm. long; bractlets 5-8 mm. long, filiform; calyx 3-5 mm. broad at anthesis, densely stellate-pubescent, the lobes ovate-lanceolate, 6-8 mm. long, incurved in age; petals obovate, rose to rose-purple, 8-20 mm. long; fruit discoid, 6-8 mm. broad; carpels 10-15, reniform, 1.5-2 mm. high, about 1 mm. thick, transversely ridged on the back and angles, smooth on the sides.

Interior valleys and foothills, Lower and Upper Sonoran Zones; Alameda and Mariposa Counties south to Kern and Santa Barbara Counties, California. Type locality: Monterey County. March-May.

3. *Eremalche kernensis* C. B. Wolf. Kern Mallow. Fig. 3194.

Eremalche kernensis C. B. Wolf, Occ. Papers Rancho Santa Ana Bot. Gard. 1: 66. 1938.

Prostrate to erect annual with sparsely stellate-puberulent stems 10-20 cm. long. Leaves deeply 3-5-lobed, 1-3.5 cm. long, about as wide or slightly wider, the lobes irregularly crenate, stellate-puberulent; petioles 1-4 cm. long; flower solitary, axillary, on pedicels 1-2.5 cm. long; bractlets filiform, 3-4 mm. long; calyx-lobes lance-triangular, 2-3 mm. wide, 7-10 mm. long, closely stellate-pubescent with 5-8-rayed hairs; petals white to pale lavender, obovate, 10-13 mm. long; carpels 8-13, transversely corrugated dorsally, about 2 mm. long, gray to light brown, dull.

Dry hills and valley floors, Lower Sonoran Zone; western Kern County, California. Type locality: Temblor Valley, Kern County. April-May.

4. *Eremalche exilis* (A. Gray) Greene. White Mallow. Fig. 3195.

Malvastrum exile A. Gray, Ives Rep. 8. 1860.

Eremalche exilis Greene, Leaflets Bot. Obs. 1: 208. 1906.

Sphaeralcea exilis Jepson, Man. Fl. Pl. Calif. 633. 1925.

An erect or decumbent annual with stems 1-4 dm. long, finely stellate-puberulent throughout. Leaves 1-2.5 cm. broad, cuneate or truncate at the base, palmately 3-5-lobed, irregularly crenate or dentate; petioles 1-4 cm. long; stipules subulate, 2-3 mm. long; flowers perfect, solitary; pedicels 0.5-3 cm. long; bractlets linear-lanceolate, 3-7 mm. long; calyx 4-6 mm. long, 2.5-3 mm. wide at anthesis, the lobes ovate-lanceolate, acuminate, stellate-puberulent inside and out, erect in fruit; petals obovate, 2-5 mm. long, white; fruit discoid, 5-7 mm. broad; carpels 10-15, orbicular-reniform, 1.5 mm. high, transversely ridged on the back and rounded angles, dark brown.

Sandy soil, Lower Sonoran Zone; Inyo and Los Angeles Counties, California, south to Arizona, northern Lower California, and Sonora; also near King City, California. Type locality: Pyramid Canyon, Colorado Desert, California. Feb.-June.

8. *SIDÁLCEA* A. Gray in Benth. Pl. Hartw. 300. 1848.

Erect or ascending annual and perennial herbs with stellate or simple pubescence and orbicular palmately lobed or divided alternate leaves. Stipules small, deciduous. Inflorescence terminal, racemose or spicate, simple or paniculately branched. Involucels absent. Flowers often polygamo-dioecious, the pistillate flowers smaller than the perfect or staminate ones. Staminal column distinctly double except in *Hickmanii* and *malachroides*. Style-branches slender, stigmatic along the inner surface. Carpels short-beaked or beakless, somewhat flattened laterally, smooth or reticulate on the sides and back, indehiscent,

1-ovulate; ovule ascending. [Name compounded from the two generic names, *Sida* and *Alcea*, because of resemblances to each.]

A genus of about 35 species in western North America, chiefly in California and Oregon. Type species, *Sida malvaeflora* DC.

Annuals; plants flowering in early spring.

Outer staminal phalanges dilated, undivided, shorter than the inner.

Carpels dorsally favose-reticulate, the meshes nearly as broad as long; herbage more or less hispid.

Bracts palmately 3-7-divided, conspicuous, equaling or exceeding the calyx-lobes.

1. *S. diploscypha*.

Bracts simple, not palmately divided, shorter than the calyx.

Divisions of cauline leaves linear-lanceolate, entire; inflorescence many-flowered; lower part of stems glabrate.

2. *S. hirsuta*.

Divisions of cauline leaves oblanceolate, irregularly 2-5-toothed; inflorescence few-flowered; stems hirsute throughout.

3. *S. Keckii*.

Carpels dorsally striate-reticulate, the meshes several times as long as broad; herbage glabrate or sparsely hirsutulous above.

4. *S. calycosa*.

Outer staminal phalanges divided into narrow divisions, not dilated, equaling the inner phalanges.

5. *S. Hartwegii*.

Perennials; plants flowering in late spring and summer.

Herbage and stems somewhat succulent; staminal column conspicuously biseriate.

6. *S. rhizomata*.

Herbage not succulent; outer phalanges of staminal column closely approximating the inner series.

Leaves thick, not vitiform; stamens numerous; plants herbaceous.

Inflorescence distinctly spiciform, the buds and flowers crowded, rachis elongating in fruit.

7. *S. pedata*.

Leaves all alike, pedately parted; stems scapose.

Leaves not alike, lower lobed only, not pedately parted; stems more or less leafy.

Spike dense; pedicels 0.5-4 mm. long at anthesis; lower part of stems hirsute or glabrate, not stellate.

Carpels 1.8-2 mm. high, about as broad, strongly reticulate, much depressed; stems procumbent; rootstocks creeping.

8. *S. ranunculacea*.

Carpels 2.5-3 mm. high, two-thirds as broad, smooth or nearly so; stems erect; rootstocks not creeping.

Lower leaves 3-6 cm. broad; stipules 3-6 mm. long; spikes narrow.

9. *S. spicata*.

Lower leaves 10-20 cm. broad; stipules 8-15 mm. long; spikes broad.

10. *S. eximia*.

Spike lax; pedicels 5-7 mm. long; stems sparsely stellate-pubescent, not hirsute; carpels distinctly reticulate.

11. *S. oregana*.

Inflorescence laxly racemose, not crowded.

Leaves distinctly lobed or parted; staminal column biseriate.

Carpels smooth; stems glabrous or nearly so.

12. *S. Hendersonii*.

Carpels distinctly reticulate, at least on the angles; stems usually pubescent.

Stems decumbent, rooting at the nodes; rootstocks creeping; leaves mostly basal.

13. *S. reptans*.

Stems erect; rootstocks not creeping; stems leafy.

Basal and cauline leaves dissimilar, the upper divided, the lower merely lobed; carpels distinctly reticulate laterally.

Pubescence of harsh stellate hairs; notches between lobes of lower leaves broad, equaling lobes.

Herbage green; pubescence coarse; stems rarely glabrate; petals 15-30 mm. long; beak stout.

14. *S. asprella*.

Herbage glaucous; pubescence minute; stems usually glabrate; petals 10-18 mm. long; beak weak.

15. *S. glaucescens*.

Pubescence soft; notches between lobes of lower leaves narrower than the lobes.

Stems and herbage green, not glaucous; stems decumbent; rachis of inflorescence densely pubescent.

Calyx-lobes 7-10 mm. long; carpels strongly reticulate dorsally.

16. *S. malvaeflora*.

Calyx-lobes 4-6 mm. long; carpels smooth dorsally.

17. *S. virgata*.

Stems and herbage glaucous; stems erect; rachis of inflorescence glabrous or nearly so.

18. *S. neo-mexicana*.

Basal and cauline leaves similar, all parted to base of blade; carpels faintly reticulate laterally, smooth dorsally.

Leaves 1-5 cm. broad, glaucous; stems cespitose; petals deep rose-purple, retuse.

19. *S. multifida*.

Leaves 5-20 cm. broad, green; stems not cespitose; petals pink to white, emarginate.

20. *S. campestris*.

Leaves crenate, scarcely lobed, flabelliform; staminal column not distinctly biseriate, the stamens clustered at the apex.

21. *S. Hickmanii*.

Leaves thin, vitiform; stamens few; flowers small, white; plants suffruticose.

22. *S. malachroides*.

1. *Sidalcea diploscypha* (Torr. & Gray) A. Gray. Fringed *Sidalcea*. Fig. 3196.

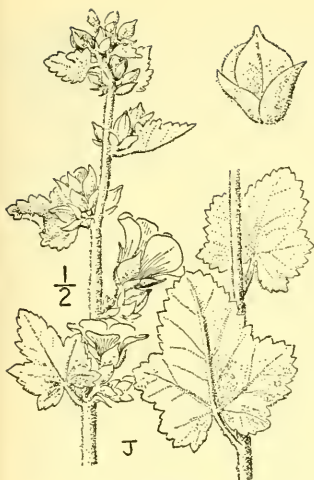
Sida diploscypha Torr. & Gray, Fl. N. Amer. 1: 234. 1838.

Sidalcea diploscypha A. Gray ex Benth. Pl. Hartw. 300. 1848.

Sidalcea diploscypha var. *minor* A. Gray, Mem. Amer. Acad. II. 4: 19. 1849.

Sidalcea secundiflora Greene, Fl. Fran. 103. 1891.

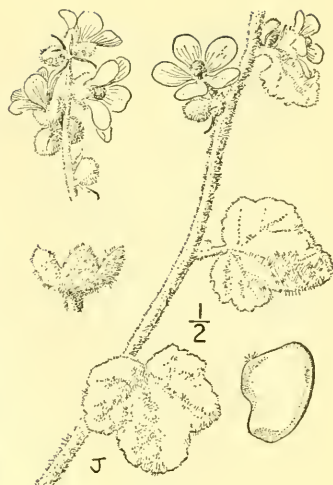
Erect annual 1-7 dm. high, pilose-hirsute throughout, short-stellate hairs intermixed with the simple. Basal leaves orbicular-cordate, crenate, 1-2.5 cm. broad; cauline leaves 2-6 cm. wide, deeply 5-7-parted, the divisions oblong, 2-3-lobed; stipules simple, linear, or 2-5-parted into filiform segments, 5-22 mm. long; inflorescence laxly racemose to cymose, few-flowered;



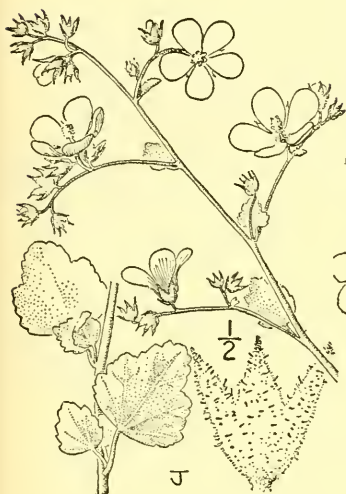
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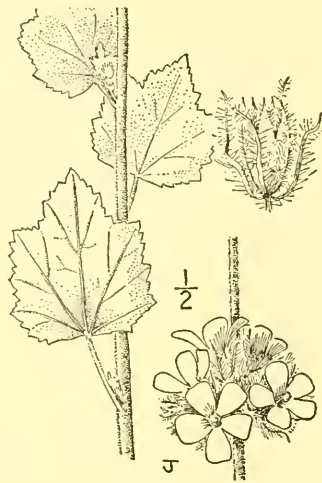
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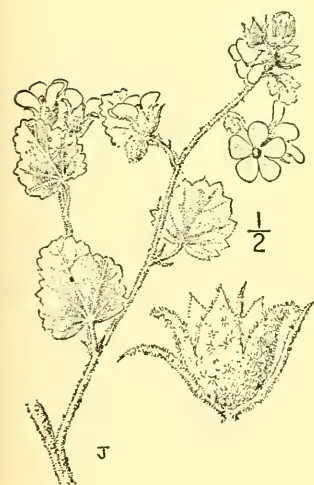
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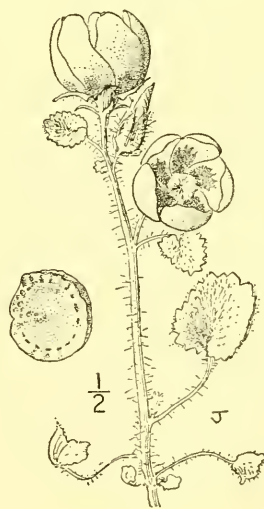
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3192

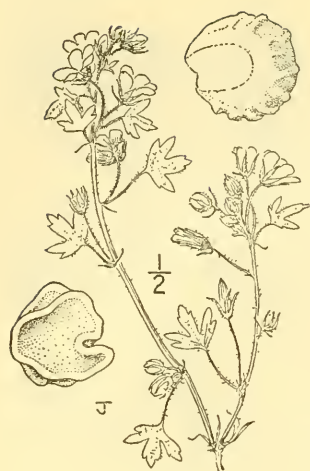


3193

3185. *Malvastrum aboriginum*
 3186. *Malvastrum Abbottii*
 3187. *Malvastrum Fremontii*

3188. *Malvastrum gracile*
 3189. *Malvastrum clementinum*
 3190. *Malvastrum densiflorum*

3191. *Malvastrum marrubioides*
 3192. *Eremalche rotundifolia*
 3193. *Eremalche Parryi*



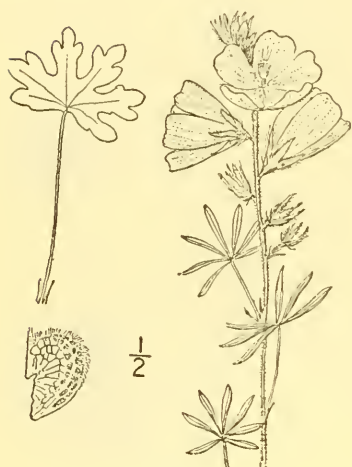
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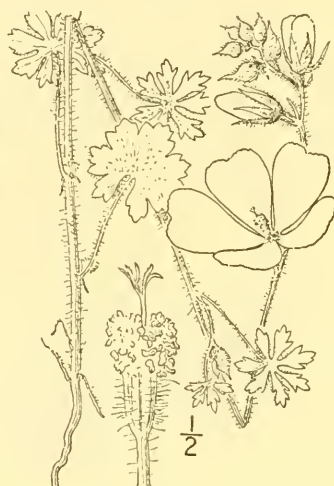
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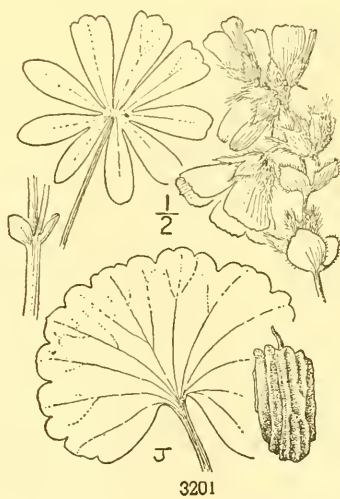
3198



3199



3200



3201



3202

3194. *Eremalche kernensis*
 3195. *Eremalche exilis*
 3196. *Sidalcea diploscypha*

3197. *Sidalcea hirsuta*
 3198. *Sidalcea Keckii*
 3199. *Sidalcea calycosa*

3200. *Sidalcea Hartwegii*
 3201. *Sidalcea rhizomata*
 3202. *Sidalcea pedata*

bracts 1.5–2.5 cm. long, palmately 5–7-parted, the segments filiform, hirsute; calyx-lobes lanceolate-subulate, 8–15 mm. long; petals rose to deep purple, with or without a deeper spot near the base, 1.5–3 cm. long; outer phalanges of staminal column 5, dilated; carpels depressed, subreniform, rugulose dorsally and on the sides, dorsal midnerve obvious.

Grassy hillsides and valleys, particularly on serpentine outcrops, Upper Sonoran Zone; Humboldt and Shasta Counties southward to Mariposa and San Luis Obispo Counties, California. Type locality: California. April–June.

2. *Sidalcea hirsuta* A. Gray. Hairy *Sidalcea*. Fig. 3197.

Sidalcea delphinifolia A. Gray ex Benth. Pl. Hartw. 300. 1848. Not *Sida delphinifolia* Nutt. 1838.

Sidalcea hirsuta A. Gray, Smiths. Contr. 3: 16. 1852.

Strict or ascendingly branched annual 1–8 dm. high, usually glabrous below, soft-hirsute above. Basal leaves round-cordate, crenately lobed, 1–2.5 cm. in diameter; cauline leaves 3–8 cm. broad, 7–9-parted, the segments narrowly linear, entire, acute, hirsute; petioles 1–5 cm. long, hirsute; stipules linear-subulate, purplish, 3–10 mm. long, ciliate; inflorescence densely spicate, 5–20 cm. long, tawny-hirsute; bracts bifid, segments linear; calyx tawny-hirsute and stellate-tomentose, the lobes triangular-lanceolate, acuminate, 8–15 mm. long; petals 1–2 cm. long, rose-purple, emarginate; outer staminal phalanges dilated, shorter than the inner; carpels 3–4 mm. high, favose-reticulate, stellate-pubescent, beak erect, 1–2 mm. high.

Margins of vernal pools and rills, Lower Sonoran Zone; Butte County to Mariposa County, California. Type locality: temporary rain pools of the Sacramento Valley. April–June.

3. *Sidalcea Kéckii* Wiggins. Keck's *Sidalcea*. Fig. 3198.

Sidalcea Keckii Wiggins, Contr. Dudley Herb. 3: 56. pl. 13. fgs. 2–6. 1940.

Annual with erect to decumbent hirsute stems 1.5–3.5 dm. high. Basal leaves orbicular, 1.5–2.5 cm. wide, shallowly 7–9-lobed, the lobes irregularly crenate-toothed, stellate-hirsute; stipules filiform, 3–5 mm. long; petioles slender, 2–4.5 cm. long, sparsely stellate-hirsute; cauline leaves deeply divided into 3–7 oblanceolate, irregularly 3–7-toothed lobes; inflorescence lax, racemose, 5–12-flowered; bracts 5–7 mm. long, bifid to the base, the lobes filiform; pedicels 2–8 mm. long; calyx deeply cleft, densely stellate-hirsute at the base, less densely so on the narrowly lanceolate-attenuate lobes, these 9–11 mm. long, 2 mm. wide at the base; petals pale pink, obovate, emarginate, 1–2.2 mm. long; staminal column 3–5 mm. high, hirsutulous, distinctly dilated above; style-branches 4–5; carpels 4–5, broadly obovoid, 3–4 mm. high, favose-reticulate, beakless, the angles rounded.

Grassy clay hillsides, Upper Sonoran Zone; western slopes of the foothills in the vicinity of White River, Tulare County, California, the type locality. April–May.

4. *Sidalcea calycosa* M. E. Jones. Annual *Sidalcea*. Fig. 3199.

Sidalcea calycosa M. E. Jones, Amer. Nat. 17: 875. 1883.

Sidalcea sulcata Curran ex Greene, Bull. Calif. Acad. 1: 79. 1885.

Annual, erect or ascending, 3–6 dm. high, glabrous below, sparsely hirsute above. Lower leaves 1.5–2 cm. broad, round-reniform, crenate, obscurely lobed, glabrous; upper leaves 3–5 cm. broad, digitately 5-parted, the divisions spatulate-linear, entire; petioles 1–6 cm. long; stipules linear to ovate-lanceolate, 3–8 mm. long; inflorescence spicate, many-flowered, sparsely hirsute; bracts bifid, the lobes ovate-lanceolate, 4–10 mm. long; calyx 5–8 mm. long, the lobes broadly ovate-lanceolate, abruptly acuminate; petals 1.5–2 cm. long, obovate, emarginate, purple; outer phalanges of staminal column slightly stouter than inner, dilated; carpels reniform, often purplish, strongly striate-grooved dorsally, finely reticulate on the seeds; seeds sparsely puberulent with very short, simple hairs.

Moist grassy places in the foothills, Upper Sonoran and Transition Zones; North Coast Ranges and the Sierra Nevada from Shasta County to Mariposa County, and in the Sacramento Valley, California. Type locality: Duncan's Mills, Sonoma County. March–June.

5. *Sidalcea Hartwegii* A. Gray. Hartweg's *Sidalcea*. Fig. 3200.

Sidalcea Hartwegii A. Gray ex Benth. Pl. Hartw. 300. 1848.

Sidalcea tenella Greene, Bull. Calif. Acad. 1: 7. 1884.

Sidalcea Hartwegii var. *tenella* A. Gray, Proc. Amer. Acad. 22: 286. 1887.

Erect, slender, paniculately branching annual, 1–5 dm. high, sparsely pubescent with soft simple hairs, or glabrate below. Basal leaves small, shallowly 5–7-lobed, caducous; upper leaves 2–4 cm. broad, digitately 3–7-parted, the divisions linear, entire, spatulate and shallowly 2–3-lobed at the apex; stipules 1–2 mm. long; inflorescence racemose, few-flowered, closely stellate-puberulent; bracts 1.5–2 mm. long, bidentate or bifid; calyx deeply cleft, the lobes lanceolate, acuminate, 6–8 mm. long; petals 10–20 mm. long, rose-purple, retuse; staminal column slender, hirsutulous below, exterior phalanges approximate to the inner at the apex; carpels reniform, beakless or weakly beaked, rugose-reticulate.

Grassy flats and hillsides, Upper Sonoran and Transition Zones; Sacramento Valley and foothills of the Sierra Nevada and the Coast Ranges from Shasta and Mendocino Counties to San Francisco Bay region and Mariposa County, California. Type locality: fields of Butte County. April–June.

6. *Sidalcea rhizomata* Jepson. Point Reyes *Sidalcea*. Fig. 3201.

Sidalcea rhizomata Jepson, Man. Fl. Pl. Calif. 629. 1925.

Perennial, stems succulent, erect or ascending, 3–4.5 dm. high with the rhizomatous bases

rooting at the nodes; herbage glabrous below, sparsely hirsute above. Basal leaves orbicular, shallowly crenately incised, 2.5–10 cm. broad; cauline leaves 7–11-parted, the divisions oblanceolate to oblong-lanceolate; stipules 8–16 mm. long, ovate, obtuse to acuminate; bracts thin, bilobed, hirsute, 1–12 mm. long; inflorescence a dense spike 1.5–3 cm. long; calyx densely hirsute, 8–12 mm. long, the lobes ovate, acuminate, 6–10 mm. long, purplish, distinctly nerved in age; petals obovate, 15–25 mm. long, rose-purple; outer phalanges of staminal column distinct; carpels striate on the back, faintly reticulate laterally, beak slender.

Marshy meadows, Humid Transition Zone; in the vicinity of Point Reyes, Marin County, California. Type locality: Russel Ranch, Point Reyes. May–July.

7. *Sidalcea pedàta* A. Gray. Pedate Sidalcea. Fig. 3202.

Sidalcea pedata A. Gray, Proc. Amer. Acad. 22: 288. 1887.

Sidalcea spicata var. *pedata* Jepson, Man. Fl. Pl. Calif. 630. 1925.

Perennial with 1 to several slender erect or ascending scapiform stems 1–5 dm. high from a tuberous-thickened root, more or less purplish throughout, glabrescent to hirsute with some intermingled stellate hairs. Leaves mostly basal, 3–5 cm. broad, all alike, pedately 5–7-parted, the divisions 2–3-lobed, the lobes linear to oblong, 1–3 mm. wide, hirsute on both surfaces, with intermingled stellate hairs beneath; petioles 3–10 cm. long, hirsute; inflorescence many-flowered, minutely stellate-puberulent; bracts simple to bifid, 3 mm. long; calyx campanulate, 2–3 mm. broad, 5–6 mm. long, the lobes narrowly lanceolate, acuminate; petals 8–10 mm. long, narrowly obovate, emarginate; carpels 2–3 mm. high, smooth and glabrous, the angles rounded, beak deltoid, recurved, ciliolate.

Wet meadows, Transition Zone; San Bernardino Mountains, California. Type locality: Bear Valley. June–Aug.

8. *Sidalcea ranunculàcea* Greene. Marsh Sidalcea. Fig. 3203.

Sidalcea ranunculacea Greene, Leaflets Bot. Obs. 1: 75. 1904.

Sidalcea interrupta Greene, loc. cit.

Sidalcea spicata var. *ranunculacea* Roush, Ann. Mo. Bot. Gard. 18: 166. 1931.

Sidalcea reptans var. *ranunculacea* Jepson, Fl. Calif. 2: 489. 1936.

Slender plant 3–5 dm. tall from a creeping horizontal rootstock, sparsely villous-hirsute throughout or stems often glabrate. Leaves orbicular in outline, 1–6 cm. broad, the lower shallowly 5–9-lobed and irregularly crenate, the upper divided into 3–7 lanceolate entire or 1–3-toothed segments; stipules broadly ovate to oblong, membranaceous, 3–8 mm. long; inflorescence a short, crowded spike 2–4 cm. long at anthesis, elongating somewhat in maturity; pedicels 0.5–3 mm. long; calyx silky-villous and with some stellate hairs, 4–6 mm. long at anthesis, the lobes lanceolate-acuminate, 1–1.5 mm. wide; petals obovate, rose-purple, 6–10 mm. long; carpels 1.5–2 mm. high, nearly as wide, depressed, distinctly reticulate, grooved on the back, beak erect or slightly recurved, 0.5 mm. high.

Moist meadows and marshy places, Transition and Canadian Zones; mountains of Tulare, Kern, and San Bernardino Counties, California. Type locality: Hockett Meadows, Sierra Nevada. July–Sept.

9. *Sidalcea spicàta* (Regel) Greene. Spiked Sidalcea. Fig. 3204.

Callirhoe spicata Regel, Gartenfl. 21: 291. pl. 737. figs. 3, 4. 1872.

Sidalcea spicata Greene, Bull. Calif. Acad. 1: 76. 1885.

Perennial 3–6 dm. high, stems hirsute at base, with intermingled stellate hairs on the leaves, upper part of the stem and the inflorescence. Leaves reniform-orbicular, hirsute on the upper surface, pubescent with geminate and stellate hairs beneath, 3–6 cm. broad, basal leaves 5–7-lobed, the lobes deeply 3–5-toothed, upper leaves palmately 5–7-divided, the divisions entire or deeply trifid, oblong to linear-lanceolate; petioles 6–15 cm. long, hirsute; inflorescence spicate, many-flowered; pedicels 2–4 mm. long at anthesis; calyx 4–8 mm. long, the lobes ovate-acute, stellate-puberulent with simple hairs along margins and midvein; petals obovate, deeply emarginate, rose-purple, 8–14 mm. long; carpels smooth or very faintly reticulate on the angles, 2.5–3 mm. high, beak small, slender, recurved.

Open coniferous forests and mountain meadows, Transition and Canadian Zones; western Oregon to Nevada, southward through the Siskiyou Mountains and Sierra Nevada to Mono County, California. Type locality: Sierra Nevada, California. June–Aug.

Sidalcea spicata subsp. *vàlida* (Greene) Wiggins. (*Sidalcea valida* Greene, Pittonia 3: 157. 1897; *Sidalcea hydrophila* Heller, Muhlenbergia 1: 107. 1904.) Only stellate-puberulent on the inflorescence; plant robust, to 2 m. tall, stems open, glabrate and purplish; spikes broad, crowded; beak stout, erect. Marshy places and wet meadows, Klamath County, Oregon, to Sonoma County, California. Type locality: Knight's Valley, Sonoma County, California.

Sidalcea spicata var. *tónsa* M. E. Peck, Madroño 6: 14. 1941. Leaves mostly devoid of long, simple hairs beneath; calyx stellate-puberulent but lacking spreading hairs except along margins of lobes. East of the Cascades from Klamath County to Wasco and Wallowa Counties and the Steen Mountains, Oregon. Type locality: Big Summit Prairie, Ochoco National Forest, Oregon.

10. *Sidalcea exímia* Greene. Coast Sidalcea. Fig. 3205.

Sidalcea eximia Greene, Cyb. Columb. 1: 34. 1914.

Robust paniculately branched plant 1–2 m. high with stout stems and coarsely hirsute herbage. Lower leaves 10–20 cm. wide, palmately cleft into 5–9 irregularly coarse-toothed lobes, petioles 15–45 cm. long; upper leaves 5–9-divided into linear or oblong, entire or few-toothed segments

3-8 cm. long; stipules lance-elliptic, membranaceous, 8-15 mm. long; inflorescence densely spicate, the spikes 2.5-4 cm. wide, paniculately arranged; bracts lance-linear, 6-10 mm. long; calyx 5-6 mm. long at anthesis, 8-12 mm. long in age, densely hirsute; petals pink, 12-15 mm. long; carpels 3-3.5 mm. high, smooth, beak slender, 1 mm. long.

Wet meadows, Humid Transition Zone; northern Humboldt County, California. Type locality: valley of the Elk River. June-Aug.

11. *Sidalcea oregana* (Nutt.) A. Gray. Oregon *Sidalcea*. Fig. 3206.

Sida oregana Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 234. 1838.

Sidalcea oregana A. Gray, Mem. Amer. Acad. II. 4: 20. 1849.

Sidalcea nervata A. Nels. Proc. Biol. Soc. Wash. 17: 94. 1904.

Erect perennial 5-15 dm. high, stellate-puberulent throughout or base of stems glabrate. Leaves orbicular, 5-10 cm. broad, palmately 5-7-lobed, the lobes 2-3-dentate at apex, harshly stellate-puberulent; upper leaves 3-5-parted, the divisions lanceolate; inflorescence spicate-racemose, many-flowered, densely stellate-puberulent; pedicels 5-7 mm. long at anthesis; calyx 3-5 mm. broad, 4-8 mm. long, the lobes triangular-lanceolate, 3-5 mm. long; petals 1-2 cm. long, obovate, emarginate, deep rose-purple; pistillate flowers smaller and darker than the perfect; carpels about 3 mm. high, reticulate on the sides and obtuse angles, lightly reticulate to smooth on the back, beak short or wanting.

Meadows and along streams, Transition Zone; central Washington to northern California and eastward to Montana and Utah. Type locality: west side of the Rocky Mountains. June-Sept.

Sidalcea oregana var. *Cusickii* (Piper) Roush. Ann. Mo. Bot. Gard. 18: 174. 1931. (*Sidalcea Cusickii* Piper, Proc. Biol. Soc. Wash. 29: 99. 1916.) Pubescence distinctly scabrous; basal leaves more deeply lobed; inflorescence congested; calyx campanulate, slightly constricted at base of lobes. Umpqua Valley, Oregon. Type locality: "In swales near Roseburg, Oregon."

12. *Sidalcea Hendersonii* S. Wats. Henderson's *Sidalcea*. Fig. 3207.

Sidalcea Hendersonii S. Wats. Proc. Amer. Acad. 23: 262. 1888.

Stout perennial 1-1.5 m. high, stems glabrous or very sparsely hirsute. Lower leaves orbicular in outline, 8-12 cm. broad, shallowly 5-7-lobed, the lobes crenate, ciliate, glabrous above, sparsely appressed-hirsute along the veins beneath; upper leaves 3-5-parted into narrow, coarsely dentate segments; stipules purplish, triangular-subulate, 8-10 mm. long, acuminate; inflorescence stellate-puberulent, densely racemose, paniculately branched; bractlets exceeding the pedicels; calyx purple-tipped, accrescent, the lobes triangular-lanceolate, 6-10 mm. long; flowers perfect or gynodioecious, the perfect larger; petals deep rose, 15-25 mm. long, obovate, truncate to shallowly emarginate at the apex; carpels 7-9, smooth and glabrous, 3.5-4 mm. high, subulate beak about 1 mm. long, recurved, persistent.

In marshes near the sea and on small islands along the coast, Humid Transition Zone; Vancouver Island, British Columbia, to Lane County, Oregon. Type locality: near the shore of Clatsop Bay, Oregon. May-July.

13. *Sidalcea reptans* Greene. Creeping *Sidalcea*. Fig. 3208.

Sidalcea reptans Greene, Pittonia 3: 159. 1897.

Sidalcea favosa Congdon, Erythea 7: 183. 1900.

Sidalcea spicata var. *reptans* Jepson, Man. Fl. Pl. Calif. 630. 1925.

Perennial with slender stems 5-8 dm. high, decumbent at the base and rooting from the nodes, hirsute throughout, few-rayed stellate hairs intermingled with simple on leaves and inflorescence. Basal leaves orbicular in outline, 2-4 cm. broad, shallowly 5-7-lobed, crenate, sinus narrow; upper leaves 5-7-parted, the segments coarsely dentate or lobed; petioles of basal leaves up to 2.5 dm. long, ascending, densely hirsute with spreading hairs, those of upper leaves shorter; stipules thin, oblong, acute to acuminate, 3-8 mm. long, purplish; inflorescence racemose, few-flowered; bracts simple or bidentate, ovate to oblong, acuminate, ciliate, equaling the pedicels; calyx 4-7 mm. long, stellate-puberulent, the lobes ovate-lanceolate, acuminate; petals obovate, 8-20 mm. long, emarginate, rose-purple; carpels favose-reticulate, lightly stellate-puberulent on the back, beak erect.

In wet meadows, Transition and Canadian Zones; Amador County to San Bernardino County, California. Type locality: Panther Creek, Amador County. June-Aug.

Sidalcea reptans var. *nana* Jepson, Fl. Calif. 2: 489. 1936. "Plants 2.5 to 3.25 inches high, the leaves in a close basal tuft; spikes 1- or 2-flowered, the flowering stems nearly naked." Trinity County, California. Type locality: Soldiers Ridge, southeast Trinity County.

14. *Sidalcea asprella* Greene. Harsh *Sidalcea*. Fig. 3209.

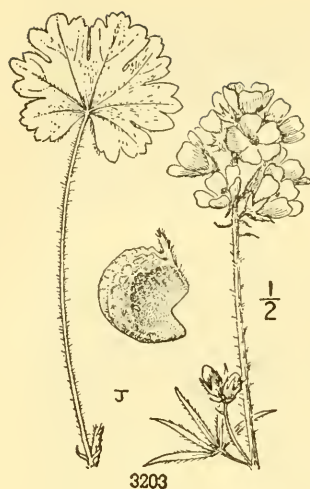
Sidalcea asprella Greene, Bull. Calif. Acad. 1: 78. 1885.

Sidalcea elegans Greene, Cyb. Columb. 1: 35. 1914.

Sidalcea malvaeflora var. *asprella* Jepson, Man. Fl. Pl. Calif. 630. 1925.

Erect herbaceous perennial 3-8 dm. high, with rough short-rayed stellate pubescence throughout. Leaves 1-10 cm. broad, palmately 5-7-lobed, the lobes crenate or irregularly dentate; stipules subulate, 3-5 mm. long; inflorescence a simple loose raceme; calyx densely stellate-puberulent, the lobes 5-10 mm. long, narrowly triangular-lanceolate, acuminate; perfect flowers larger and paler than the pistillate; petals 15-30 mm. long, obovate, emarginate, rose-purple; carpels 3-4 mm. high, strongly reticulate, angles acute, beak stout, somewhat recurved.

Hillsides, Transition Zone; Marion County, Oregon, south to Humboldt County in the Coast Range



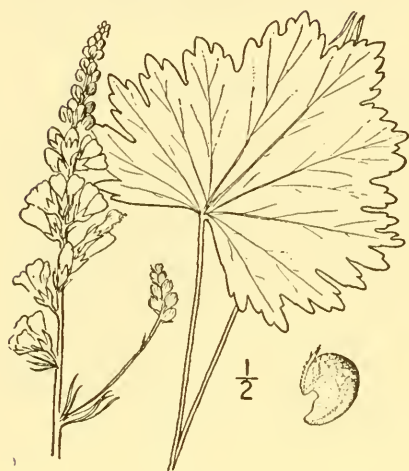
3203



3204



3205



3206



3207



3208



3209



3210

3203. *Sidalcea ranunculacea*
 3204. *Sidalcea spicata*
 3205. *Sidalcea eximia*

3206. *Sidalcea oregana*
 3207. *Sidalcea Hendersonii*
 3208. *Sidalcea reptans*

3209. *Sidalcea asprella*
 3210. *Sidalcea glaucescens*

and on the lower western slopes of the Sierra Nevada to southern California. Type locality: near Comptonville, Yuba County, California. April–Aug.

Sidalcea asprella var. *robusta* (Roush) Jepson, Fl. Calif. 2: 490. 1936. Stems stout, glabrous below; lower surfaces only of leaves stellate-pubescent; flowers 25–32 mm. long; calyx lobes 3-nerved. Foothills, Butte County, California. Type locality: near Chico, Butte County.

15. *Sidalcea glaucescens* Greene. Glaucous *Sidalcea*. Fig. 3210.

Sidalcea glaucescens Greene, Bull. Calif. Acad. 1: 77. 1885.

Sidalcea montana Congdon, Erythea 7: 183. 1900.

Perennial 5–8 dm. high from a woody root, glaucous and minutely stellate-puberulent to glabrescent throughout. Basal leaves round-reniform, 2–4 cm. broad, 5–7-lobed, the lobes simple or usually shallowly 3-dentate, the teeth rounded or acute, cauline leaves more deeply parted, the lobes and teeth narrower, those of uppermost leaves lanceolate, entire; petioles slender, 2–10 cm. long; inflorescence a loose, few-flowered raceme, up to 3 dm. long, stellate-pubescent; pedicels 3–10 mm. long; calyx 3–4 mm. broad, the lobes triangular-lanceolate, 5–6 mm. long, acuminate, becoming broader and conspicuously veined in fruit; petals 12–18 mm. long, rose-purple, obovate; carpels about 4 mm. high, favose-reticulate, sparsely puberulent, beak minute.

Mountain meadows and hillsides, Transition and Canadian Zones; Siskiyou and Lassen Counties southward in the Sierra Nevada to Mariposa County, California. Type locality: Summit Station, Donner Pass. June–Aug.

16. *Sidalcea malvaeflora* (DC.) A. Gray. Checker Bloom. Fig. 3211.

Sida malvaeflora DC. Prod. 1: 474. 1824.

Sida delphinifolia Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 235. 1838.

Sidalcea malvaeflora A. Gray in Benth. Pl. Hartw. 300. 1848.

Sidalcea humilis A. Gray, Mem. Amer. Acad. II. 4: 20. 1849.

Sidalcea scabra Greene, Pittonia 3: 158. 1897.

Decumbent to suberect perennial, 5–9 dm. high, retrorsely hirsute throughout, often with intermingled stellate hairs. Leaves orbicular, 1–8 cm. broad, the lower 7–9-lobed, the lobes crenate; upper leaves 5–7-parted, the segments cuneiform, entire to 3-lobed; petioles 2–15 cm. long; stipules ovate-lanceolate, 5–6 mm. long; inflorescence racemose, few-flowered; calyx-lobes narrowly triangular-lanceolate, 2 mm. wide, 7–10 mm. long, stellate-pubescent with few simple hairs on margins and nerves; petals rose-pink or rarely white, 1–2.5 cm. long, emarginate; carpels about 3 mm. high, rugose-reticulate on back and sides, beak erect.

Grassy hillsides and meadows, Upper Sonoran and Transition Zones; Curry County, Oregon, southward through the Coast Ranges to northern Lower California. Type locality: Monterey, California. March–July.

Sidalcea malvaeflora var. *celata* Jepson, Fl. Calif. 2: 493. 1936. Herbage stellate-hispid, bearing few simple hairs; basal leaves deeply lobed or cleft; inflorescence more elongated. Upper Sacramento Valley, California. Type locality: Olinda, Shasta County, California.

Sidalcea malvaeflora var. *californica* (Nutt.) Jepson, Man. Fl. Pl. Calif. 630. 1925. Velvety stellate-tomentose throughout, nearly devoid of simple hairs; leaves less deeply lobed and more densely stellate-pubescent than in the species; calyx-lobes strongly 3–5-nerved. Hillsides and low mountains from the vicinity of Lompoc, Santa Barbara County, to Ojai Valley, Ventura County, California. Type locality: Santa Barbara.

Sidalcea malvaeflora subsp. *rostrata* (Eastw.) Wiggins (*Sidalcea rostrata* Eastw. Bull. Torrey Club, 29: 80. 1902.) Leaves all orbicular, dentate to shallowly lobed and dentate, densely strigose-hirsute, the hairs simple; calyx-lobes lance-attenuate, 8–14 mm. long; carpels strongly beaked. Coastal cliffs and near-by slopes, Humboldt County to Monterey County, California. Intergrading with the species inland. Type locality: Mendocino, Mendocino County.

17. *Sidalcea virgata* Howell. Rose *Sidalcea*. Fig. 3212.

Sidalcea virgata Howell, Fl. N.W. Amer. 101. 1897.

Perennial, 2–6 dm. high with 1 to several erect stems softly stellate-pubescent throughout. Leaves orbicular, 4–7 cm. broad, 5–7-lobed, sinuses narrow, lobes coarsely irregular-dentate, pubescence denser on upper surface than on lower; inflorescence virgate, racemose, stellate-puberulent; calyx-lobes 5–6 mm. long, triangular-lanceolate, acuminate; petals rose-purple, shallowly emarginate or truncate, 6–10 mm. long in pistillate flowers, twice as long as perfect flowers; carpels about 3 mm. high, finely and highly reticulate on the angles, the back smooth or nearly so.

Dry hillsides, Humid Transition Zone; Willamette Valley, Oregon. Type locality: Willamette Valley. May–July.

18. *Sidalcea neo-mexicana* A. Gray. Rocky Mountain *Sidalcea*. Fig. 3213.

Sidalcea neo-mexicana A. Gray, Mem. Amer. Acad. II. 4: 23. 1849.

Sidalcea parviflora var. *Thurberi* Robinson in A. Gray, Syn. Fl. N. Amer. 1¹: 305. 1897.

Sidalcea crenulata A. Nels. Proc. Biol. Soc. Wash. 17: 93. 1904.

Sidalcea confinis Greene, Cyb. Columb. 1: 35. 1914.

Erect perennial 1–8 dm. high, hirsute to glabrescent throughout, occasionally a few geminate or stellate hairs on leaves and calyces. Leaves orbicular, 1–6 cm. broad, crenate to shallowly 5–9-lobed, the lobes crenate; upper leaves 3–5-divided, the segments entire or 2–5-lobed, ciliate; inflorescence racemose, many-flowered; rachis glabrous to sparsely hirsute or stellate-pubescent; bracts 0.5–1 cm. long, bifid; pedicels densely hirsute to glabrous; calyx 4–6 mm. long, more or less hirsute and with a few intermingled stellate hairs in some specimens, the lobes triangular-ovate, acuminate; petals 10–15 mm. long, rose-purple; carpels 2.5–3 mm. high, nearly as wide,

reticulate on the angles, the back usually smooth, beak stout, obtuse, somewhat reflexed, hispid-tipped.

Mountain meadows, Arid Transition Zone; eastern Oregon, Idaho and Wyoming southward through Nevada and Utah to Coahuila and Durango. Type locality: Las Playas, New Mexico. May–Aug.

Sidalcea neo-mexicana var. *parviflora* (Greene) Roush, Ann. Mo. Bot. Gard. 18: 186. 1931. (*Sidalcea parviflora* Greene, Erythea 1: 148. 1893.) Differs from the species in being less pubescent and more glaucous throughout, having thicker leaves, smaller, less conspicuous bracts, more stellate calyces and pedicels, and more erect, narrower beak. Subalkaline soil from southern Monterey County (Jolon) to eastern San Bernardino County, California. Type locality: Santa Monica, Los Angeles County.

Sidalcea neo-mexicana var. *Covillei* (Greene) Roush, op. cit. 187. Differing from the preceding in being sparsely stellate-pubescent and less glaucous throughout; pedicels and calyx-lobes more densely stellate-puberulent, devoid of coarse, simple hairs; beaks of the carpels broader, obtuse, recurved. In the vicinity of Lone Pine, Inyo County, California. Type locality: Haiwee Meadows.

19. *Sidalcea multifida* Greene. Cut-leaved *Sidalcea*. Fig. 3214.

Sidalcea multifida Greene, Cyb. Columb. 1: 34. 1914.

Cespitose perennial 2–5 dm. tall, from a woody root, pale glaucous and stellate-puberulent throughout. Leaves 1–5 cm. broad, 5–7-parted into 2–7-lobed cuneate segments, the lobes linear to oblong, segments of upper leaves sometimes entire; stipules linear-lanceolate, 5–8 mm. long; inflorescence few-flowered, racemose, minutely stellate-puberulent; bracts ovate, bidentate or bifid, equaling the pedicels; calyx densely stellate-puberulent, the lobes narrowly triangular-lanceolate, acuminate, about 2 mm. wide, 4–6 mm. long, purplish; petals deep rose-purple, 14–20 mm. long, erose, retuse; carpels about 2.5 mm. high, delicately reticulate on the sides, smooth or nearly so on the back, sparsely and minutely puberulent; beaks small, 0.5 mm. or less high, erect.

Dry foothills and alkaline flats, Arid Transition Zone; Klamath County, Oregon, to Lander County, Nevada. Type locality: foothills near Reno, Nevada. May–July.

20. *Sidalcea campestris* Greene. Meadow *Sidalcea*. Fig. 3215.

Sidalcea campestris Greene, Bull. Calif. Acad. 1: 76. 1885.

Sidalcea asplenifolia Greene, Pittonia 3: 158. 1897.

Sidalcea sylvestris A. Nels. Proc. Biol. Soc. Wash. 20: 36. 1907.

Stout perennial 0.5–2 m. tall, hirsute at base, stellate-puberulent above. Leaves orbicular, 5–20 cm. broad, the lower 7–9-lobed, the lobes 2–5-dentate; upper leaves divided into 3–9 linear or cuneate, entire or pinnatifid segments; petioles 10–20 cm. long, hirsute; inflorescence densely racemose, stellate-puberulent; calyx-lobes deltoid, 3–4 mm. broad, 4–6 mm. long, stellate-puberulent, hirsute on the nerves and margins; petals 1.5–2 cm. long, obovate, deeply emarginate, rose-purple to nearly white; carpels 3.5 mm. high, lightly rugose-reticulate, furrowed on the back, puberulent, beak slightly recurved, weak.

Grassy pastures and hillsides, Humid Transition Zone; confined to the Willamette Valley, Oregon. Type locality: vicinity of Multnomah, Oregon. May–July.

21. *Sidalcea Hickmanii* Greene. Hickman's *Sidalcea*. Fig. 3216.

Sidalcea Hickmanii Greene, Pittonia 1: 139. 1887.

Suffrutescent perennial from a woody root, stems procumbent to erect, leafy and densely stellate-pubescent throughout. Leaves flabelliform to reniform-orbicular, 1.5–4 cm. broad, crenate to shallowly lobed; petioles stout, 0.5–2 cm. long; stipules 3–5 mm. long, linear to ovate-lanceolate; inflorescence loosely racemose, few-flowered; bracts narrowly linear to lanceolate, 4–6 mm. long, ciliate; bracteoles 3, similar to the bracts; pedicels 2–3 mm. long; calyx deeply divided, 6–8 mm. long, the lobes deltoid, abruptly acute or acuminate; petals rose-purple, about 5–6 mm. long, in pistillate flowers, paler and 10–15 mm. long in perfect flowers, obovate, slightly emarginate; staminal column very short; carpels glabrous, smooth except for a few transverse wrinkles on the angles.

Hillsides, Upper Sonoran Zone; Big Carson Ridge, Marin County, and the Santa Lucia Mountains, Monterey County, California. Type locality: Reliz Canyon, Monterey County. May–July.

Sidalcea Hickmanii var. *Parishii* Robinson in A. Gray, Syn. Fl. N. Amer. 11: 307. 1897. Similar to the species but with larger, broader bracts, less leafy stems and congested spiciform inflorescence. On burns and meadows, Transition Zone; San Bernardino Mountains, California. Type locality: western slopes of the San Bernardino Mountains.

22. *Sidalcea malachroides* (Hook. & Arn.) A. Gray. Maple-leaved *Sidalcea*. Fig. 3217.

Malva malachroides Hook. & Arn. Bot. Beechey 326. 1840.

Sidalcea malachroides A. Gray, Proc. Amer. Acad. 7: 332. 1868.

Sidalcea vitifolia A. Gray, Proc. Amer. Acad. 7: 332. 1868.

Hesperalcea malachroides Greene, Pittonia 2: 301. 1892.

Erect leafy perennial 1–2 m. high, pubescent throughout with soft, simple hairs and few-rayed stellate hairs. Leaves vitiform, palmately 3–7-lobed, 2–15 cm. broad, coarsely dentate; stipules 3–7 mm. long, lanceolate, membranous; inflorescence densely spicate-paniculate; bractlets linear, simple or bifid, 6–9 mm. long, ciliate; calyx stellate-pubescent, the lobes narrowly ovate-lanceolate, 6–12 mm. long, acuminate, membranous and strongly veined when mature; petals

white, deeply emarginate, 6-18 mm. long; flowers gynodioecious; carpels orbicular-reniform, 3-4 mm. high, smooth, glabrous or sparsely stellate-puberulent.

Along streams and in moist places near the coast, Upper Sonoran and Transition Zones; Curry County, Oregon, to southern Monterey County, California. Type locality: California. Collected by Douglas. May-July.

9. *MÁLVA* L. Sp. Pl. 687. 1753.

Annual, biennial, or perennial, procumbent to erect herbs. Leaves alternate with pubescent, lobed or dissected suborbicular blades. Flowers perfect, solitary or in axillary clusters or in terminal spikes, subtended by 2-3 distinct bractlets. Calyx 5-cleft, the lobes broad. Petals 5, emarginate. Fruit discoid. Carpels numerous, 1-celled, indehiscent, beakless, reniform, 1-seeded. Ovule ascending. [Name Greek, referring to the emollient properties of the leaves.]

A genus of about 30 species, of Europe, Asia, and Africa. Type species, *Malva tomentosa* L.

Leaves deeply palmately dissected; petals white.

1. *M. moschata*.

Leaves rounded or shallowly lobed; petals rose-tinged to purple.

Carpels reticulate dorsally.

Calyx-lobes strongly reflexed at maturity; petals scarcely equaling the calyx-lobes, the claws glabrous; carpels pubescent.

2. *M. parviflora*.

Calyx-lobes incurved at maturity; petals 2-4 times as long as calyx, the claws villous-ciliate.

Petals white, tinged with rose at apex and along the veins, 5-12 mm. long; bractlets of calyx ovate.

3. *M. nicaeensis*.

Petals mauve-purple, 15-20 mm. long; bractlets oblong-lanceolate.

4. *M. sylvestris*.

Carpels smooth dorsally, pubescent.

5. *M. rotundifolia*.

1. *Malva moschàta* L. Musk Mallow. Fig. 3218.

Malva moschata L. Sp. Pl. 690. 1753.

Perennial herb, 5-8 dm. high, from a woody rootstock, sparsely pubescent throughout with simple and stellate hairs. Leaves suborbicular in outline, the lower small, 1 cm. or less broad, shallowly incised, the cauline 2-5 cm. broad, deeply 3-5-parted, the divisions further incised or lobed; petioles hirsute, 0.5-5 cm. long; stipules subulate-lanceolate, 3-8 mm. long, villous-ciliate, membranaceous; flowers in a crowded terminal raceme, usually a few solitary in the axils of upper leaves; bractlets ovate-lanceolate, 3-4 mm. long; calyx 8-10 mm. long, the lobes broadly ovate, acute; petals obovate, emarginate, 10-15 mm. long, white, the claws villous; fruit discoid; carpels numerous, densely hispid dorsally, orbicular-reniform, beakless, side walls smooth or lightly striate.

Waste places and roadsides, Upper Sonoran and Transition Zones; British Columbia to Nova Scotia, and southward to Oregon, Wisconsin, and Virginia. Type locality: Italy. Summer.

2. *Malva parviflòra* L. Cheese-weed. Fig. 3219.

Malva parviflora L. Amoen. Acad. 3: 416. 1756.

Malva obtusa Torr. & Gray, Fl. N. Amer. 1: 225. 1838.

An erect, widely branching annual or biennial, 2 dm. to 2 m. high, sparsely stellate-pubescent to glabrate throughout. Leaves suborbicular in outline, 1.5-10 cm. broad, shallowly 5-7-lobed, cordate at base, dentate to crenate; petioles 3-15 cm. long; stipules triangular- to ovate-lanceolate, 5-8 mm. long; flowers in axillary clusters or sometimes solitary; pedicels slender, 2-12 mm. long; bractlets linear-lanceolate, 3-5 mm. long; calyx pubescent, 4-6 mm. long at anthesis, the deltoid-ovate lobes spreading to form a rotate scarious disk 12-16 mm. broad in fruit; petals obovate, emarginate, 4-6 mm. long, white, tinged with rose or purple at tips and along the veins, claw glabrous; carpels 8-12, reniform-orbicular, transversely reticulate dorsally, dentate on the angles, puberulent; seed minutely papillate-puberulent.

A wayside weed, chiefly in the Upper Sonoran Zone; Humboldt County, California, to Lower California and Sonora; adventive to North Dakota, Missouri, and along the Atlantic seaboard. Type locality: described from cultivated plants at Upsala, Sweden. April-Nov.

3. *Malva nicaeensis* All. Bull Mallow. Fig. 3220.

Malva nicaeensis All. Fl. Ped. 2: 40. 1785.

Malva borealis of authors. Not *M. borealis* Wallm.

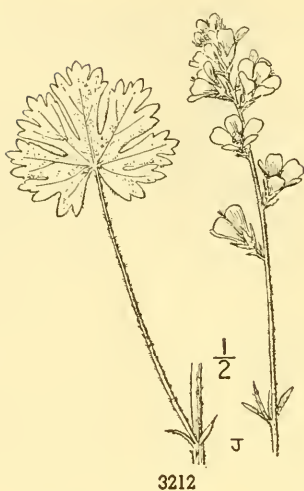
Malva pusilla of authors. Not *M. pusilla* With. nor *M. pusilla* Smith.

Erect, spreadingly branched annual 0.3-1.5 m. high, sparsely pubescent throughout or the stems glabrous. Leaves orbicular-cordate in outline, 2-10 cm. broad, shallowly 5-7-lobed, irregularly crenate; petioles 5-15 cm. long; stipules deltoid-ovate, acute, 3-8 mm. long; flowers in axillary clusters; pedicels 5-20 mm. long; bractlets ovate- to oblong-lanceolate, acute, 4-8 mm. long; calyx 4-6 mm. long and pubescent at anthesis, later glabrate, the lobes deltoid-ovate, becoming scarious, finely reticulate and closely incurved over fruit at maturity; petals obovate, deeply emarginate, 8-12 mm. long, pale rose-lavender with darker veins, the claws white, villous; carpels 8-12, reniform-orbicular, 3-4 mm. high, rugose-reticulate on the back, angles smooth, not dentate; seeds smooth, glabrous.

An introduced weed in waste places, mostly in the Upper Sonoran Zone; Humboldt County southward to San Bernardino, California, east to Montana. Type locality: Europe. April-Nov.



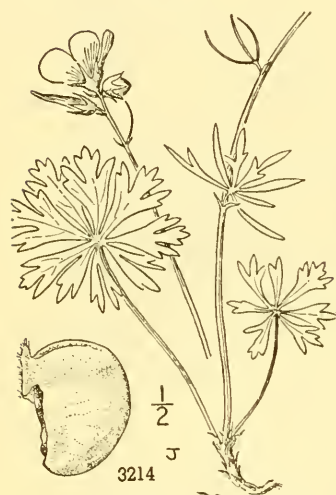
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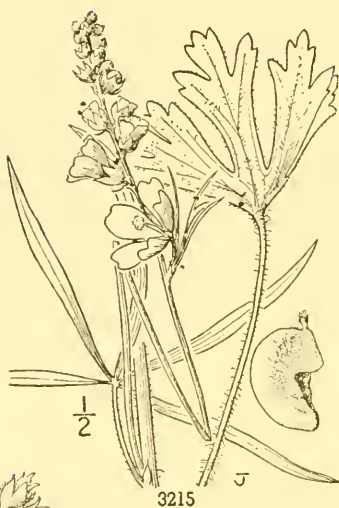
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3211. *Sidalcea malvaeflora*
 3212. *Sidalcea virgata*
 3213. *Sidalcea neo-mexicana*

3214. *Sidalcea multifida*
 3215. *Sidalcea campestris*
 3216. *Sidalcea Hickmanii*

3217. *Sidalcea malachroides*
 3218. *Malva moschata*

4. *Malva sylvestris* L. High Mallow. Fig. 3221.*Malva sylvestris* L. Sp. Pl. 689. 1753.

An erect or branching biennial herb 3–10 dm. high with stout stems and glabrous or sparsely pubescent herbage. Leaves suborbicular, cordate, shallowly 5–7-lobed, 3–10 cm. broad; petioles 2–20 cm. long, more densely pubescent than the stems or leaves; stipules ovate-acuminate, 5–10 mm. long; flowers in axillary clusters; pedicels 1–2.5 cm. long, glabrous; bractlets oblong-lanceolate, acute, 3–7 mm. long; calyx 4–7 mm. long and pubescent at anthesis, the lobes accrescent, closely incurved over fruit at maturity; petals narrowly cuneate, deeply emarginate, 15–20 mm. long, deep mauve-purple, the claws villous-ciliate; style-branches dark purple; carpels about 10, orbicular-reniform, 3–3.5 mm. high, rugose-reticulate on the back and sides, the angles rounded.

In waste places and along roadsides at scattered stations from Oregon to Quebec, south to central California, Colorado, and North Dakota; also sparingly adventive in southern California, Mexico, and Florida. Type locality: Europe. May–Oct.

5. *Malva rotundifolia* L. Round-leaved Mallow. Fig. 3222.*Malva rotundifolia* L. Sp. Pl. 688. 1753.

A profusely branched procumbent annual with stellate-pubescent to glabrate herbage. Leaves round-reniform, 3–6 cm. broad, very shallowly 5–7-lobed, the lobes rounded, crenate; petioles 5–10 cm. long, erect; flowers solitary or in few-flowered axillary clusters; pedicels 5–15 mm. long; bractlets linear-lanceolate, 3–4 mm. long; calyx-lobes ovate, acute, 4–5 mm. long, slightly accrescent; petals obovate, emarginate, 8–10 mm. long, pale lilac or whitish, the claws villous on the margins; fruit discoid, the central axis broad; carpels 12–15, rounded, puberulent, smooth or very inconspicuously reticulate on the back, the angles rounded.

Roadsides and waste places, Washington east to Massachusetts, southward to central California and North Carolina. Also known as a weed in Imperial County, California. Type locality: Europe. April–Nov.

Callirhoe involucreta (Torr. & Gray) A. Gray, Mem. Amer. Acad. II 4: 16. 1849. Herbage hirsute; leaves 4–8 cm. broad, palmately divided into 3–7 irregularly incised or lobed divisions; flowers solitary in the axils on slender peduncles 10–25 cm. long; involucrellate bractlets 2–3, lance-linear, 10–15 mm. long; calyx deeply cleft, the lobes lanceolate, 10–15 mm. long; petals rose-purple, 2–2.5 cm. long, broadly obovate; carpels 12–20, about 3 mm. high, sparsely hirsute, strongly reticulate transversely on the backs, short-beaked. Locally abundant but thought to be adventive near Medford, Jackson County, Oregon.

10. *LAVATÈRA* L. Sp. Pl. 690. 1753.

Stout herbs or arborescent shrubs with large, long-petioled palmately lobed leaves, caducous stipules, and showy axillary flowers. Involucrel 2–3-lobed. Pedicels jointed below the flowers. Calyx 5-lobed. Petals 5, obtuse to truncate or emarginate, short-clawed. Ovary discoid. Carpels 5–12, beakless, 1-seeded, indehiscent. [Named for a Swiss physician, Lavater.]

A genus of about 30 species growing near the coast in the Mediterranean region, Canary Islands, Australia, central Asia, and on the islands off the coast of southern and Lower California. Type species, *Lavatera arborea* L.

Shrubs; flowers 3.5–6 cm. broad; calyx tubular-campanulate, twice as high as broad at anthesis.

1. *L. assurgentiflora*

Herbs; flowers 2–2.5 cm. broad; calyx broadly cup-shaped, as broad as high at anthesis.

2. *L. cretica*.1. *Lavatera assurgentiflora* Kell. *Malva Rosa*. Fig. 3223.*Lavatera assurgentiflora* Kell. Proc. Calif. Acad. 1: 14. 1854.*Savinionia clementina* Greene, Leaflets Bot. Obs. 2: 160. 1911.*Savinionia reticulata* Greene, op. cit. 161.*Savinionia dendroidea* Greene, loc. cit.*Savinionia suspensa* Greene, op. cit. 162.*Savinionia assurgentiflora* Greene, op. cit. 163.

Shrub 1–5 m. high with smooth bark and finely stellate-puberulent leaves and young branches. Leaves thin, 4–20 cm. broad, palmately 5–7-lobed halfway to the petiole, the lobes ovate-deltoid, coarsely dentate; petioles 8–12 cm. long; stipules 2–3 mm. long, triangular-subulate; flowers 1 to several in axils of the leaves; pedicels 3–5 cm. long, recurved-assurgent; involucrellate bractlets united at the base, oblong-lanceolate, 7–10 mm. long; calyx 10–18 mm. long, the lobes deltoid-ovate, accrescent; petals 2.5–4.5 cm. long, truncate to emarginate, rose with darker veins, the claws pubescent at the base; fruit depressed, glabrous to puberulent; carpels 6 mm. high, 1-seeded.

Coastal slopes, Upper Sonoran Zone; on the islands off the coast of southern California, naturalized and used as windbreak along the mainland coast as far north as San Francisco. Type locality: Anacapa Island, California. April–Nov.

Lavatera arborea L. Sp. Pl. 690. 1753. A small shrub with densely stellate-pubescent herbage; erect pedicels; deltoid-ovate involucrellate bracts which exceed the calyx-lobes; smaller, darker violet-purple flowers; and smaller, lightly reticulate carpels. Introduced from Europe and escaped at Pebble Beach near Pescadero, San Mateo County, and at San Diego, California.

2. *Lavatera cretica* L. Cretan Lavatera. Fig. 3224.*Lavatera cretica* L. Sp. Pl. 690. 1753.

Stout herbaceous annual or biennial with erect, ascendingly branched stems 0.6–1.5 m. high. Leaves pentagonal, shallowly and obtusely 3–5-lobed, crenate, stellate-hirsutulous to

glabrate, dark green, 4-15 cm. long; petioles 5-20 cm. long, stellate-hirsute; stipules lance-deltoid, 5-8 mm. long; bractlets ovate, 3-6 mm. wide, 4-10 mm. long, abruptly acute; calyx short-hirsute, 5-6 mm. wide and broad at anthesis, the lobes ovate, acute, accrescent; petals narrowly obovate, 10-12 mm. long, emarginate, white tinged with rose or lavender; fruit discoid; carpels 8-12, 3-3.5 mm. high, smooth dorsally, radiately reticulate laterally.

Introduced from Europe and established as a weed in the San Francisco Bay region. Type locality: Crete. May-Sept.

11. *SIDA* L. Sp. Pl. 683. 1753.

Perennial herbs or shrubs. Herbage stellate-scurfy. Leaves alternate. Involucellate bractlets 1-3, distinct, linear. Flowers perfect, solitary or clustered in the axils of the leaves; pedicels articulate. Petals (in ours) stellate-puberulent on the exposed outer part. Staminal column simple, antheriferous at the summit. Styles filiform; stigmas capitate. Carpels 5-12, 1-celled, 1-seeded, indehiscent or incompletely 2-valved. Seeds pendulous, 3-angled. Embryo curved, endosperm scanty. [The Greek name of some plant.]

A genus of 150 species or more in the warmer parts of both hemispheres, represented in our region by one species. Type species, *Sida spinosa* L.

1. *Sida hederacea* (Dougl.) Torr. Alkali Mallow. Fig. 3225.

Malva hederacea Dougl. ex Hook. Fl. Bor. Amer. 1: 107. 1830.

Sida obliqua Torr. & Gray, Fl. N. Amer. 1: 233. 1838.

Sida hederacea Torr. ex A. Gray, Mem. Amer. Acad. II. 4: 23. 1849.

Disella hederacea Greene, Leaflets Bot. Obs. 1: 209. 1906.

Stems 1-5 dm. long; herbage densely stellate-scurfy-canescant throughout. Leaves 1-5 cm. broad, ovate-subcordate to obliquely subreniform, crenate, prominently veined beneath; petioles thick, 1-2 cm. long; stipules linear-subulate, 3-4 mm. long, marcescent; calyx campanulate to turbinate, the lobes ovate to ovate-lanceolate, 2-3 mm. broad, 6-10 mm. long, short-acuminate; bractlets linear, 3-5 mm. long; petals 1-2 cm. long, narrowly obovate, pale cream, dotted or suffused with lavender or rose, stellate-puberulent along one side; staminal column short, glabrous; fruit conical-truncate, 5-8 mm. wide, about 4-5 mm. high; carpels 6-10, dark brown, triangular, sparsely stellate-puberulent on the backs.

In alkaline or heavy soil, Lower and Upper Sonoran Zones; Washington south to northern Lower California, east to Utah, Texas, and adjacent Mexico. Type locality: "interior districts of the Columbia." June-Oct.

12. *ANODA* Cav. Diss. 1: 38. pl. 10. 1785.

Herbaceous annuals with hastate, deltoid or cordate, alternate leaves, glabrous to sparsely pubescent throughout. Flowers solitary (in ours), or in terminal racemes. Calyx accrescent. Petals obovate, yellow, violet, or purple. Staminal column short. Fruit discoid, hirsute to glabrate. Carpels 5-20, cristate, muticous or smooth, pubescent or glabrate dorsally, 1-seeded. Seeds pendulous to horizontal, ovate-reniform, turgidly rounded on the angles. [Ceylonese name for some *Abutilon*, applied to the American genus by Cavanilles.]

A genus of 15 or 20 species, chiefly in Mexico, extending into Arizona, New Mexico, and Texas; adventive in the middle San Joaquin Valley, California. Type species, *Sida cristata* L.

1. *Anoda cristata* var. *digitata* (A. Gray) Hochr. Crested Anoda. Fig. 3226.

Anoda arizonica A. Gray, Proc. Amer. Acad. 22: 298. 1887.

Anoda arizonica var. *digitata* A. Gray, Proc. Amer. Acad. 22: 298. 1887.

Anoda triangularis var. *digitata* Robinson in A. Gray, Syn. Fl. N. Amer. 1: 319. 1897.

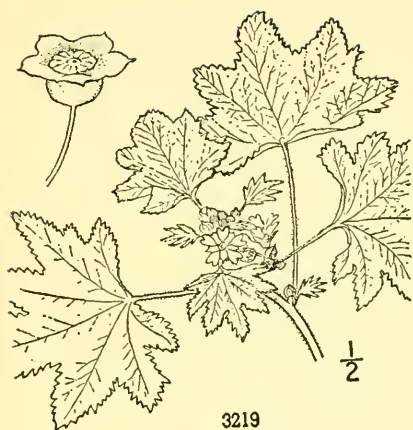
Anoda cristata var. *digitata* Hochr. Ann. Conserv. & Jard. Bot. Genève 20: 47. 1916.

Annual erect herb 1-1.5 m. high, paniculately branched above, sparsely pubescent with stiff, spreading hairs. Leaves variable, ovate-triangular to hastate, sometimes 3-5-lobed, acute at the apex, serrate or crenate, 5-7 cm. broad, 6-8 cm. long; petioles slender, about equaling the blades; flowers solitary or in few-flowered axillary clusters, the pedicels hispid, 3-6 cm. long; calyx 4-5 mm. long in flower, densely canescent, the lobes narrowly triangular-lanceolate, 10-15 mm. long and spreading in fruit; petals broadly obovate, 6-9 mm. long, pale purple or bluish; staminal column short, minutely pubescent at the base; fruit discoid, 10-15 mm. broad; carpels 10-20, cristate dorsally, hispid-pubescent, appendage 2-4 mm. long, the dissepiments rupturing at maturity; seeds turgidly reniform-ovate, minutely papillose, dark brown.

Growing occasionally as an adventive weed in gardens and cultivated fields, Upper and Lower Sonoran Zones; central San Joaquin Valley and adjacent foothills of the Sierra Nevada from Amador County to Mariposa County, California. Native in Arizona, New Mexico, Texas, and adjacent Mexico. Type locality: southern Arizona. June-Sept.

13. *HIBISCUS* L. Sp. Pl. 693. 1753.

Herbs, shrubs, or small trees. Flowers showy, axillary (in ours) solitary. Leaves alternate, entire or variously lobed, estipulate. Involucel of several to many linear bractlets. Calyx 5-cleft. Staminal column bearing anthers along upper half, but naked at the



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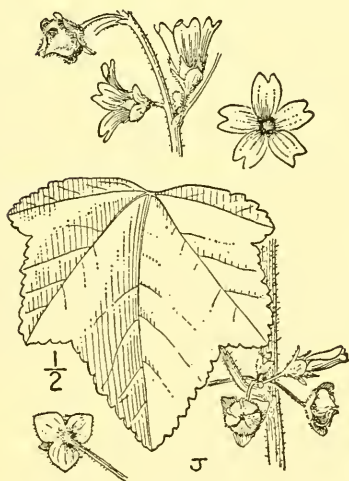
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3219. *Malva parviflora*
 3220. *Malva nicaeensis*
 3221. *Malva sylvestris*

3222. *Malva rotundifolia*
 3223. *Lavatera assurgentiflora*

3224. *Lavatera cretica*
 3225. *Sida hederacea*

5-toothed summit. Style-branches 5, short. Stigmas capitate. Ovary 5-celled, 2 to several ovules in each cell. Capsule loculicidal. Seeds minutely papillate to short-hairy. [Greek name used by Dioscorides for the marsh mallow.]

A genus of about 200 species of the tropical and warm temperate parts of the world. Some species frequently cultivated as ornamentals. Type species, *Hibiscus moschatius* L.

Annual; leaves pedately lobed or divided; calyx inflated.

1. *H. Trionum*.

Perennial; leaves merely serrulate or dentate; calyx not inflated.

Leaves 5–15 cm. long; seeds papillate; involuclate bracts equaling calyx.

2. *H. californicus*.

Leaves 1–3 cm. long; seeds silky-hairy; involuclate bracts shorter than the calyx.

3. *H. denudatus*.

1. *Hibiscus Trionum* L. Bladder Ketmia or Flower-of-an-hour. Fig. 3227.

Hibiscus Trionum L. Sp. Pl. 697. 1753.

Depressed annual branching from the base, sparsely pubescent throughout with spreading hairs. Leaves ovate to orbicular in outline, 2–6 cm. long, pedately 3–7-lobed or divided, the lobes obtuse, dentate-crenate or crenately cleft, the middle one longer; petioles hirsute, about equaling the blade; involuclate bracts linear, hirsute-ciliate, about two-thirds as long as the calyx at anthesis; flowers axillary to the upper leaves, 2.5–4 cm. broad, pale yellow, purplish at the center; calyx 5-angled, 1–1.5 cm. long at anthesis, hispid-nerved and prominently nerved, becoming larger and inflated in fruit; petals tinged with purple on the outer edge; capsule globose-ovoid, 10–15 mm. high, hirsute, black; seeds roughened with short papillate processes.

In waste places from South Dakota to Nova Scotia and south to Kansas and Florida; in California rare, at Stockton and Riverside. Adventive from southern Europe. Type locality: Italy. June–Sept.

2. *Hibiscus californicus* Kell. California Hibiscus. Fig. 3228.

Hibiscus californicus Kell. Proc. Calif. Acad. 4: 292. 1873.

Hibiscus moscheutos var. *occidentalis* Torr. Bot. Wilkes Exp. 256. 1874.

Hibiscus lasiocarpus var. *occidentalis* A. Gray, Proc. Amer. Acad. 22: 303. 1887.

Hibiscus lasiocarpus var. *californicus* Bailey, Cycl. Hort. 1486. 1915.

A stout, freely branching shrub, 1–2.5 m. high, densely pubescent throughout with short-rayed stellate hairs. Leaves ovate to orbicular-cordate, 5–10 cm. broad, dentate, acute to acuminate at the apex, dark green above, lighter beneath; petioles stout, about equaling the blades; flowers subterminal, each flower on a stout peduncle 2–3 cm. long, from the side of which a small leaf arises about halfway between the base and the joint; involuclate bractlets linear-subulate, 2–3 cm. long, closely clasping the calyx; calyx 2–2.5 cm. long, 5-cleft, the lobes ovate-lanceolate, short-acuminate; petals 6–10 cm. long, white or roseate, deep crimson at the base; capsule ovoid, 2.5–3 cm. long, acute, slightly stellate-pubescent; seeds round, striate, minutely papillate.

On low islands and wet banks, Upper and Lower Sonoran Zones; Sacramento River, Butte County to the lower San Joaquin River, California. Type locality: Webb's Landing, on an island in the San Joaquin River. Sept.–Oct.

3. *Hibiscus denudatus* Benth. Pale Face or Rock-hibiscus. Fig. 3229.

Hibiscus denudatus Benth. Bot. Sulph. 7. pl. 3. 1844.

Hibiscus denudatus var. *involuclatus* A. Gray, Smiths. Contr. 3^o: 22. 1852.

Suffruticose perennial 3–9 dm. high, erect or diffusely branching, the stems slender, sparsely leaved, roughly canescent-tomentose throughout with short-rayed, stellate hairs. Leaves ovate to orbicular, 1–3 cm. long, serrulate, prominently veined beneath, smooth above; flowers axillary, solitary; involuclate bractlets 4–7, setaceous, half as long as the calyx or shorter, sometimes nearly wanting; calyx narrowly ovoid, 5-cleft nearly to the base, 5–8 mm. long, the lobes triangular-lanceolate, acuminate; petals 1–2 cm. long, white to rose-purple, capsule ovoid-globose, acute, glabrous, slightly shorter than the calyx, dehiscent to the base; seeds reniform, dark brown, covered with silky hairs 3–4 mm. long.

Rocky slopes and hillsides, Lower Sonoran Zone; vicinity of Palm Springs in the Colorado Desert, California, to central Texas, southern Lower California and central Sonora. Type locality: Magdalena Bay, Lower California. Flowering after rains, chiefly spring and summer.

Gossypium barbadense L. Sp. Pl. 693. 1753. Cotton. A suffrutescent plant with slender, brown-barked, sparsely pubescent or glabrous stems and large palmately 3–5-lobed leaves 6–10 cm. broad; petioles 5–15 cm. long; stipules triangular-lanceolate, 3–4 mm. broad, 10–15 mm. long, scarious; flowers perfect, axillary; bractlets 3, 2.5–3 cm. broad, 3–4 cm. long, the summit deeply dissected into 10–15 narrowly triangular-lanceolate divisions, purplish; calyx-lobes short, 5–10 mm. long, 10–18 mm. wide, glabrous; petals 3–4.5 cm. long, obovate, cream-colored and more or less purplish at the base; fruit a loculicidally dehiscent, 3–5-valved capsule, 2–4 cm. in diameter; seeds ovoid-oblong, 5–8 mm. long, covered with long, white fibers and a short persistent wool. Grown for the cotton in the San Joaquin and Imperial Valleys in California and there occasionally escaping from cultivation. Native in the Barbados.

Family 93. STERCULIACEAE.

STERCULIA FAMILY.

Herbs, shrubs, or trees, usually more or less stellate-pubescent, and often with simple hairs intermixed. Leaves alternate, simple or rarely compound, pinnately or palmately nerved; stipules usually present, often caducous. Flowers perfect or uni-



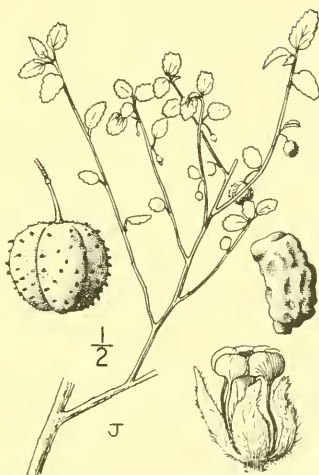
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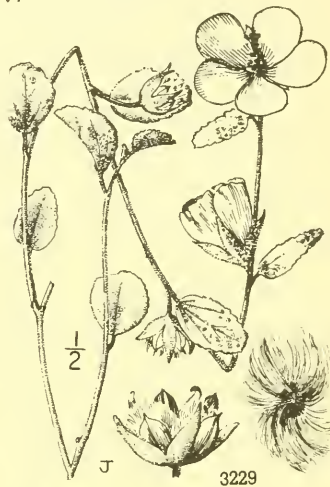
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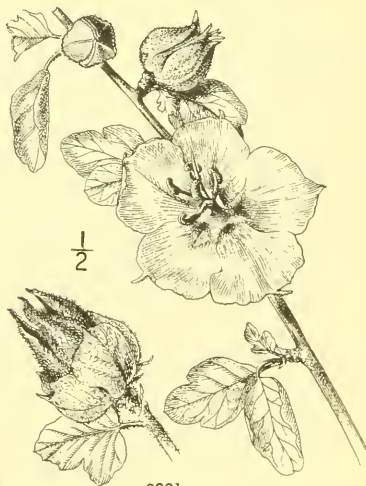
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3226. *Anoda cristata*
3227. *Hibiscus Trionum*
3228. *Hibiscus californicus*

3229. *Hibiscus denudatus*
3230. *Fremontia californica*

3231. *Fremontia mexicana*
3232. *Ayenia compacta*

sexual, commonly axillary. Calyx persistent, 4-5-lobed or -parted, sometimes petaloid. Petals 5, hypogynous, sometimes wanting. Stamens 5, alternating with the petals, usually united below into a column. Pistil compound, free; ovary 3-5-celled or rarely 10-12-celled; ovules 1 to many, anatropous or rarely orthotropous; style simple, or with as many branches as ovary-cells. Fruit a capsule, or rarely a nut or berry. Seeds with a bony or membranaceous coat; endosperm present or none.

A family of 50 genera and about 800 species, mainly tropical and most abundant in the Old World.

Flowers showy; calyx corolla-like, yellow, the lobes rounded; corolla none; tree or arborescent shrub.

1. *Fremontia*.

Flowers small; petals with a filamentous claw, the limb hooded, brownish; low desert shrub.

2. *Ayenia*.

1. *FREMONTIA* Torr. Smiths. Contr. 6²: 5. *pl.* 2. 1853.

Arborescent shrubs or small trees, with hard wood, dark bark, and more or less stellate branchlets. Leaves persistent, entire or commonly more or less palmately lobed, stellate-pubescent. Stipules lanceolate, caducous. Bractlets 3 or 5, small, caducous. Sepals 5, large, petaloid, nectariferous-pitted at base. Petals none. Stamens 5, their filaments united below into a column, adnate at the base to calyx; anthers elongate-oblong, extrorse. Ovary 5-celled; ovules several in each cell, anatropous; style subulate, stigmatic at the apex. Capsule ovoid-prismatic, firm-coriaceous, loculicidally 5-valved. Seeds ovoid, black, bony, with a small caruncle at the chalaza end; endosperm present.

A genus of 2 species, natives of California and Lower California. Type species, *Fremontia californica* Torr.

Gland of the calyx-lobes hairy; fruit not acuminate.

1. *F. californica*.

Gland of the calyx-lobes not hairy; fruit distinctly acuminate.

2. *F. mexicana*.

1. *Fremontia californica* Torr. California Fremontia. Fig. 3230.

Fremontia californica Torr. Smiths. Contr. 6²: 5. *pl.* 2. 1853.

Chiranthodendron californicum Baillon, Hist. Pl. 4: 70. 1873.

Fremontodendron californicum Coville, Contr. U.S. Nat. Herb. 4: 74. 1893.

Fremontia obispoensis Eastw. Leaflets West. Bot. 1: 140. 1934.

Arborescent shrub or small tree, 3-8 m. high, trunk with a rough bark, young twigs more or less densely covered with a short-stellate pubescence. Leaves ovate to broadly ovate, entire or commonly 3-lobed, 1-2.5 cm. long, green above, with scattering stellate hairs, canescent beneath with a dense short-stellate puberulence; petioles usually shorter than the blades; bractlets small, lanceolate-subulate; flowers 3-5 cm. broad, yellow; sepals broadly ovate, mucronate, stellate without, more or less bristly at the base within, especially on the large sunken gland; capsule ovoid, 2-2.5 cm. long, densely bristly; seeds dark brown, short-pubescent.

Hillsides and mountain slopes, Upper Sonoran and Transition Zones; in the Sierra Nevada from Tehama County, and in the Coast Ranges from San Luis Obispo County, southward to San Diego County, California. Type locality: "Sources of the Sacramento, in the northern part of the Sierra Nevada." April-June.

Fremontia californica subsp. *crassifolia* (Eastw.) Abrams. (*Fremontia crassifolia* Eastw. Leaflets West. Bot. 1: 139. 1934.) Arborescent shrub, 2-3 m. high, young twigs of the season densely pubescent with rather long-rayed stellate hairs, becoming glabrous and reddish brown in age. Leaves broadly ovate or rounded, commonly 3-lobed with broad rounded lobes, cordate at base, glossy green and thinly stellate above, densely stellate below; petioles densely long-stellate like the twigs, the pubescence becoming ferruginous in age; flowers yellow, 5-6 cm. broad; gland on the inner surface of the sepals hairy. Chaparral-covered slopes, Upper Sonoran and Humid Transition Zones; Santa Cruz Mountains, central California. Type locality: on hills above Big Basin Park, north of Governor's Camp, Santa Cruz County, California.

Fremontia californica var. *napensis* (Eastw.) McMin, Ill. Man. Calif. Shrubs 355. 1939. (*Fremontia napensis* Eastw. Leaflets West. Bot. 1: 140. 1934.) Shrub, often spreading from the base, 2-3 m. high, young twigs of the season densely stellate-pubescent with very short-rayed stellate hairs, the older portion of the branchlets glabrous and reddish brown. Leaves 1-2 cm., rarely 2.5 cm. long, entire to shallowly 3-5-lobed, obtuse or rounded at base, rather dark green above with scattering short-rayed stellate hairs, pale green and densely stellate beneath, the pubescence whitish at first, becoming ferruginous in age; calyx yellow or often tinged with rose, small, the sepals commonly only 1-1.5 cm. long. Chaparral-covered slopes, Upper Sonoran Zone; Coast Ranges of southern Lake County and adjacent Napa County, California. Type locality: north side of Mount Saint Helena, Napa County. Small-flowered plants usually with smaller subentire leaves occur almost throughout the range of the species, but none of these seems as extreme in its variations as the plants from the Mount Saint Helena region.

Margaret Harvey (Madroño 7: 100-110. 1943) has made critical herbarium studies of *Fremontia* and recognizes 5 species: *F. californica* Torr., *F. napensis* Eastw., *F. crassifolia* Eastw., *F. obispoensis* Eastw., and *F. mexicana* (Davidson) J. F. MacBride. Under *F. californica* she also recognizes 4 varieties, which she distinguishes as follows:

Leaves variously lobed: (a) leaves dull green or dark green above, pubescence decidedly tawny below and often matted, variety *typica* (Shasta County to San Diego County); (b) leaves bright green above, pubescence whitish below, not tawny, variety *viridis* (Tehama County).

Leaves entire, dull green or dark green above, pubescence of lower surface becoming tawny: (c) petioles short, one-half to one-third the length of the blade, variety *integra* (Tulare and Kern Counties); (d) petioles longer than one-half the length of the blade, variety *diegensis* (San Diego County).

As the typical form of the species seems to occur throughout the range, the biological significance of these variations is not clear. Much more study, especially in the field, must be given before the constancy of the characters noted can be determined.

2. *Fremontia mexicana* (Davidson) J. F. Macbride. Mexican *Fremontia*.
Fig. 3231.

Fremontodendron mexicana Davidson, Bull. S. Calif. Acad. 16: 50. 1917.

Fremontia mexicana J. F. Macbride, Contr. Gray Herb. No. 53: 14. 1918.

Fremontia californica var. *mexicana* Jepson, Man. Fl. Pl. Calif. 637. 1925.

Arborescent shrub or small tree, 3–6 m. high, the branches widely spreading, branchlets densely clothed with long-rayed stellate pubescence, this yellowish or ferruginous often becoming blackened in age, usually deciduous the second year leaving a smooth reddish brown bark. Leaves round-ovate in outline, 5-lobed with broad rounded lobes and narrow sinuses, deeply cordate at base, 2.5–3.5 cm. long, conspicuously 5-veined and thick, dark green above with scattered often dark stellate hairs, pale beneath and densely stellate-pubescent; petioles about equaling or shorter than the blades, densely stellate; calyx 6–7 cm. in diameter, orange becoming tinged with red at base and on the midrib, stellate exteriorly, the rounded pits on the inner surface of the lobes near the base not hairy; capsule ovoid, acuminate, 3–4 cm. long; seeds black, shining.

Open chaparral, Upper Sonoran Zone; Otay Mountain, San Diego County, California, southward into northwestern Lower California. Type locality: described from cultivated tree, planted in San Diego, the original source of which is not definitely known. See a discussion of its possible origin by Margaret Harvey (Madroño 7: 109. 1943).

2. *AYÈNIA* Loeefl. Iter. Hisp. 199. 1758.

Herbs or low woody plants, stellate-pubescent, hirsute or glabrescent. Leaves alternate, serrate. Flowers small, axillary. Calyx 5-parted. Petals 5, long-clawed, the limb cucullate-concave, the apex inflexed and adnate to the stamen-column concealing the anthers. Stamen-column short, bearing 5 fertile stamens alternating with 5 staminodia; anthers 3-celled. Ovary stipitate, 5-celled; ovules 2 in each cell. Style simple; stigma capitate or obscurely 5-lobed. Capsule globose, muricate; carpels 5, separating septicidally and then splitting loculicidally. Seeds 1 in each carpel, transversely rugose; endosperm none; cotyledons spirally convolute around the radicle. [Name in honor of the Duc d'Ayen.]

An American genus of about 15 species inhabiting the tropical and warm temperate regions. Type species, *Ayenia sidaeformis* Loeffl.

1. *Ayenia compácta* Rose. *Ayenia*. Fig. 3232.

Ayenia compacta Rose, Contr. U.S. Nat. Herb. 8: 321. 1905.

Ayenia californica Jepson, Man. Fl. Pl. Calif. 637. 1925.

Low shrub, 1–4 dm. high, much branched from the base, branches gray-green-tomentose with 2–3-forked hairs. Leaves ovate to oblong-ovate, 5–15 mm. long, serrate, minutely stellate on both surfaces, about twice as long as the slender petioles; flowers solitary in the axils, on slender pedicels, brownish, 2 mm. long; capsule 4 mm. in diameter, stellate-pubescent and muricate with black glands.

Rocky canyons, Lower Sonoran Zone; western edge of the Colorado Desert, Riverside County, California, to central Lower California. Type locality: near Santa Rosalia, Lower California. March–May.

Family 94. **HYPERICACEAE**.*

ST. JOHN'S-WORT FAMILY.

Herbs or shrubs, sometimes small trees in tropical regions, with opposite or rarely verticillate simple entire or rarely glandular-ciliate or dentate leaves, no stipules, resinous juice, and terminal or axillary, solitary or cymose-paniculate flowers. Foliage pellucid-punctate or black-dotted. Flowers regular and perfect. Sepals 5 or 4, imbricated, herbaceous, persistent. Petals of the same number, hypogynous, generally oblique or contorted. Stamens numerous or few, hypogynous, often in sets of 3 or 5; anthers versatile or innate, 2-celled, longitudinally dehiscent. Ovary superior, 1–7-celled, composed of 1–7 carpels; styles as many as the carpels; ovules numerous, in 2 rows in each cavity, anatropous. Fruit mainly capsular; seeds with a straight embryo; endosperm none.

A family of about 40 genera and over 800 species, mostly of temperate and warm regions. Only the following genus is represented in the Pacific States.

1. *HYPÉRICUM* [Tourn.] L. Sp. Pl. 783. 1753.

Herbs or shrubs, with opposite, sessile, more or less punctate leaves, and mostly cymose yellow flowers. Sepals 5, equal or nearly so. Petals 5, mainly oblique or contorted, con-

* Text contributed by George Neville Jones.

volute in the bud, deciduous or marcescent. Stamens 5 to many, distinct, or more or less united in clusters, sometimes with interposed hypogynous glands. Ovary 1-celled, with 3-5 parietal placentae which sometimes project far into the cavity, or 3-5-celled (rarely 6-celled); ovules generally numerous; styles 3-6. Capsule 1-5-celled (rarely 6-celled). [Ancient Greek name, of obscure meaning.]

About 300 species, of wide geographical distribution, principally in subtropical regions. In addition to the following, 25 others occur in eastern and southern United States. Type species, *Hypericum perforatum* L.

Petals much longer than the sepals; capsule 3-celled.

Leaves flat, obtuse; stems few from a rhizome.

Leaves oval, 2-3 cm. long; stems simple.

Leaves oblong-linear, 1-2 cm. long; stems much branched.

Leaves folded, acutish, linear-lanceolate; stems numerous, from a woody caudex.

Petals shorter than or only slightly longer than the sepals; capsule 1-celled.

Leaves usually less than 1 cm. long; stamens 15-20.

Leaves 1-4 cm. long; stamens 5-12.

Leaves lanceolate to linear; flowers 6-10 mm. broad.

Leaves ovate or oval; flowers 2-4 mm. broad.

1. *H. formosum* Scouleri.

2. *H. perforatum*.

3. *H. concinnum*.

4. *H. anagalloides*.

5. *H. majus*.

6. *H. mutilum*.

1. *Hypericum formosum* var. *Scouleri* (Hook.) J. M. Coulter. Scouler's St. John's-wort. Fig. 3233.

Hypericum Scouleri Hook. Fl. Bor. Amer. 1: 111. 1830.

Hypericum formosum var. *Scouleri* J. M. Coulter. Bot. Gaz. 11: 108. 1886.

Perennial, stems erect, few from a rhizome, slender, simple, or branched at the summit, 15-60 cm. high, lacking sterile basal shoots. Leaves ovate, oval or lanceolate, flat, obtuse, black-dotted along the margins, sessile by a more or less clasping base, 1-3 cm. long; flowers 15-20 mm. broad, in more or less paniculate cymes; sepals ovate or oval, 3-4 mm. long, obtuse or acutish, with a few sessile black glands; petals obovate, bright yellow, black-dotted on the margin, 7-9 mm. long; stamens numerous, in 3 clusters; anthers black-dotted; capsule 3-lobed, 6 mm. long.

In wet meadows and along streams, Upper Sonoran and Transition Zones; British Columbia to Wyoming, Utah, and southern California. Type locality: "Abundant in dry gravelly soils and limestone rocks on the North-West coast of America, near the Columbia." June-Aug.

Hypericum formosum H.B.K. Nov. Gen. & Sp. 5: 196. pl. 460. 1821. The typical species has the sepals narrower and sharply acute or acuminate, and usually more glandular-dotted, with the glands forming minute glandular teeth on the margins. It ranges from southern Mexico to New Mexico and Arizona, with intergrades in Colorado, Utah, and San Bernardino Mountains, southern California. Type locality: Pazuaro, Mexico.

2. *Hypericum perforatum* L. Common St. John's-wort. Fig. 3234.

Hypericum perforatum L. Sp. Pl. 785. 1753.

Perennial, herbaceous from a woody base, 30-60 cm. high, much branched; stems erect, stoloniferous, with numerous short sterile shoots at base. Leaves sessile, oblong or linear, 1-2 cm. long, 2-4 mm. wide, obtuse, more or less black-dotted; cymes terminal, many-flowered; flowers bright yellow, 15-25 mm. broad; sepals lanceolate, acute, pellucid-dotted, shorter than the linear-oblong copiously black-dotted petals which are twisted after anthesis; stamens united at their bases into 3 sets; styles 3, usually spreading; capsule ovoid, 4-6 mm. long, 3-celled, glandular, not lobed, reddish.

In fields and waste ground, a very noxious weed, difficult to exterminate, poisonous to horses. Naturalized from Europe. British Columbia to central California, and eastward to the Atlantic Coast. Type locality: Europe. June-Sept. Klamath Weed, Tipton-weed.

3. *Hypericum concinnum* Benth. Gold Wire. Fig. 3235.

Hypericum concinnum Benth. Pl. Hartw. 300. 1848.

Hypericum bracteatum Kell. Proc. Calif. Acad. 1: 65. 1855.

Perennial, stems slender, wiry, tufted, numerous from a woody caudex, forming a bushy plant 15-30 cm. high. Leaves numerous, thickish, linear to lanceolate, acute, ascending or spreading, narrow at the base, not clasping, usually folded, sparsely black-dotted, 1.5-3 cm. long; flowers 2-2.5 cm. broad, in rather close terminal cymes; sepals ovate, or lanceolate, acute or acuminate, 5-9 mm. long; petals golden yellow, obovate, 10-15 mm. long, black-dotted on the margin, much longer than the sepals; stamens numerous, 4 of the filaments in each of the 3 clusters distinctly united at base, the others free; styles long, divaricately spreading; capsule 3-celled and 3-lobed, 10-12 mm. long.

Dry ridges and slopes in the mountains, Upper Sonoran and Arid Transition Zones; North Coast Ranges, and the Sierra Nevada from Butte County to Mariposa County, California. Type locality: said to have been collected in the "Sacramento Valley," but probably on one of Hartweg's trips from the valley into the Sierra Nevada, in Butte County or along the American River. May-July.

4. *Hypericum anagalloides* Cham. & Sch. Creeping St. John's-wort or Tinker's Penny. Fig. 3236.

Hypericum anagalloides Cham. & Sch. Linnaea 3: 127. 1828.

Hypericum anagalloides var. *nevadense* Greene, Fl. Fran. 113. 1891.

Hypericum bryophyllum Elmer, Bot. Gaz. 36: 60. 1903.

Hypericum tapetoides A. Nels. Bot. Gaz. 52: 266. 1911.

Annual or perennial, often forming dense mats; stems numerous, weak, slender, procumbent

or ascending, rooting at the lower nodes, with angled, simple or dichotomous branches 3–25 cm. high. Leaves pale, obtuse, ovate or elliptic, 5–7 nerved, somewhat clasping, 5–15 mm. long; cymes peduncled, loose, the branches elongated or sometimes the flowers solitary on very short peduncles; petals small, not dotted, 6–8 mm. broad, dark yellow; sepals unequal, lanceolate, obtuse or acute, 2–4 mm. long; petals 3–4 mm. long, oval; stamens 15–20; styles short; capsule 1-celled, about 3 mm. long.

Springy places and wet meadows, Transition and Boreal Zones; British Columbia to Lower California. Type locality: San Francisco, California. June–July.

5. *Hypericum majus* (A. Gray) Britt. Larger Canadian St. John's-wort. Fig. 3237.

Hypericum canadense var. *major* A. Gray, Man. ed. 5. 86. 1867.

Hypericum majus Britt. Mem. Torrey Club 5: 225. 1894.

Annual or perennial, stem erect, 10–70 cm. high, usually branched above, the branches strict, nearly erect. Leaves lanceolate to linear, sessile or somewhat clasping, 5–7-nerved, 1–4 cm. long, acute or obtuse at the apex; cymes several- to many-flowered; bracts subulate; flowers 6–10 mm. broad; sepals 5–7 mm. long, lanceolate, acuminate, about as long as the petals or shorter; stamens 5–12; styles 3; capsule narrowly conical, acute, 8–10 mm. long, longer than the sepals; seeds minute, cross-lined and faintly longitudinally striate.

Wet ground, Humid Transition Zone; Washington (Green Lake, Seattle, Piper) and British Columbia; also in Colorado and the Eastern States. Type locality: Lake Superior. July–Aug.

6. *Hypericum mutilum* L. Small-flowered St. John's-wort. Fig. 3238.

Hypericum mutilum L. Sp. Pl. 787. 1753.

Ascyrum Crux-Andree L. loc. cit.

Usually annual, slender, erect or ascending, generally tufted, abundantly and diffusely branched, 15–50 cm. high; branchlets 4-angled. Leaves ovate to oval, sessile, clasping, obtuse,



3233. *Hypericum formosum*
3234. *Hypericum perforatum*

3235. *Hypericum concinnum*
3236. *Hypericum anagalloides*

3237. *Hypericum majus*
3238. *Hypericum mutilum*

1-2 cm. long, 4-15 mm. wide, 5-nerved at the base; cymes many-flowered, terminal, subulate-bracted; pedicels slender, 2-12 mm. long; flowers 2-4 mm. broad, light orange-yellow; sepals foliaceous, linear-ob lanceolate, acutish or obtuse, much shorter than or slightly longer than the petals; stamens 5-12; styles 3; capsule ovoid, pointed, 1-celled, 2-4 mm. long, somewhat longer than the sepals.

Introduced along ditches and shores; lower Sacramento and lower San Joaquin Rivers, California; also Nova Scotia to Manitoba, Kansas, Florida, and Texas. Type locality: Europe. Aug.-Sept.

Family 95. ELATINACEAE.

WATERWORT FAMILY.

Low herbs or some tropical species woody, with opposite or verticillate, entire or serrate leaves and small stipules. Flowers small, axillary or fascicled, perfect and regular. Sepals 2-5, imbricated. Petals of the same number as the sepals, hypogynous. Stamens of the same number as the petals or twice as many. Ovary 2-5-celled; styles of the same number, stigmatic at the apex; ovules many, anatropous. Capsule ovoid or globose, septicidal, with the placentae central. Seeds reticulately rugose or ribbed.

A family of 2 genera and 35 species, of wide geographical distribution.

Flowers 2-4-merous; plants glabrous, growing in or near water.

1. *Elatine*.

Flowers 5-merous; plants pubescent, terrestrial.

2. *Bergia*.

1. ELATINE L. Sp. Pl. 367. 1753.

Small glabrous herbs, growing in water or creeping on mud, suggesting the chickweeds in general habit. Flowers minute, mainly solitary in the axils, in submerged plants often remaining closed. Sepals 2-4, membranous, persistent. Petals of the same number. Stamens of the same number or twice as many; styles 2-4. Capsule globose, membranous, 2-4-valved. [Name Greek, meaning fir-like, in reference to the leaves.]

A genus of 15 species, widely distributed in temperate and tropical regions. Type species, *Elatine Hydropiper* L.

Flowers 2-5-merous, sessile; seeds nearly or quite straight.

Petals and stamens 3; seeds indistinctly sculptured.

1. *E. triandra*.

Petals and stamens normally 2; seeds distinctly sculptured.

Leaves obovate; seeds with 9-10 longitudinal lines and 20-30 crossbars.

2. *E. americana*.

Leaves oblong or oval; seeds with 6-7 longitudinal lines and 10-12 crossbars.

3. *E. brachysperma*.

Flowers 4-merous, the stamens usually 8, short-pedicelled; seeds strongly curved.

4. *E. californica*.

1. *Elatine triandra* Schk. Long-stemmed Waterwort. Fig. 3239.

Elatine triandra Schk. Bot. Handb. 1: 345. 1791.

Plants immersed or terrestrial, tufted or creeping, flaccid, the stems 5-10 cm. long. Leaves oblong or oblanceolate, very thin, 4-8 mm. long; flowers sessile, minute; sepals commonly 2; petals, stamens and stigmas 3; seeds slender, slightly curved, rather faintly sculptured with 11-12 longitudinal and 15-20 transverse lines.

Shallow ponds and pools, Transition Zones; rarely collected, has been found in Washington (Usk), Colorado, South Dakota, Nebraska, and Illinois; also in Europe. Type locality: Germany. July-Sept.

2. *Elatine americana* (Pursh) Arn. American Waterwort. Fig. 3240.

Peplis americana Pursh, Fl. Amer. Sept. 238. 1814.

Elatine americana Arn. Edinb. Journ. Sci. 1: 430. 1830.

Tufted slightly fleshy herb, the stems 2-4 cm. long, growing on mud or often submerged. Leaves obovate, obtuse, 2-6 mm. long; flowers sessile, 2-merous or rarely 3-merous in the terrestrial forms; capsule globose, about 1 mm. in diameter; seeds nearly 1 mm. long, slightly curved, marked by 9-10 longitudinal lines and 20-30 crossbars.

Margins of ponds and streams, Transition and Boreal Zones; British Columbia to the mountains of southern California and across the continent. Type locality: Pennsylvania. June-Sept.

3. *Elatine brachysperma* A. Gray. Short-seeded Waterwort. Fig. 3241.

Elatine brachysperma A. Gray, Proc. Amer. Acad. 13: 361. 1878.

Plants tufted, terrestrial or sometimes submerged, the stems 2-5 cm. long. Leaves oblong, varying from oval to lanceolate, usually oblong, narrowed at the base, 4-6 mm. long; flowers sessile, minute, 2-merous or rarely 3-merous; seeds short-oblong, about 0.5 mm. long, distinctly sculptured with 6-7 longitudinal lines and 10-12 crossbars.

Margins of ponds, Upper Sonoran Zone; eastern Washington and Oregon to the Coast Ranges of central and southern California, east to Ohio. Type locality: Illinois. April-May.

4. *Elatine californica* A. Gray. California Waterwort. Fig. 3242.

Elatine californica A. Gray, Proc. Amer. Acad. 13: 364. 1878.

Plants forming small mats or tufts, terrestrial or submerged, the stems 2-5 cm. long. Leaves obovate to oblanceolate, 3-4 mm. long; flowers minute, on short pedicels; sepals and petals 4; stamens 8; stigmas and ovary cells 4; seeds strongly curved, rounded on one end, truncate and apiculate on the other, marked with 8-10 longitudinal lines, and 20-25 crossbars.

Margins of ponds and pools, Arid Transition Zone; eastern Washington (Spokane County) south to the mountains of southern California. Type locality: Sierra Valley, altitude 5,000 feet, Sierra Nevada, California. May-Aug.

2. *BÉRGIA* L. Mant. 1: 152, 241. 1771.

Herbs, or somewhat woody plants, with diffuse or ascending branches, more or less pubescent. Leaves opposite, serrate or entire. Flowers small, in axillary clusters, 5-merous or rarely 3-4-merous. Capsule crustaceous, ovoid, 5-valved. Seeds many, reticulately sculptured with longitudinal lines and crossbars. [Name in honor of Dr. P. J. Bergius, 1723-90, professor of natural history in Stockholm.]

About 15 species, chiefly in warm temperate and tropical regions. Type species, *Bergia capensis* L.

1. *Bergia texana* (Hook.) Seub. Texas Bergia. Fig. 3243.

Merimea texana Hook. Ic. Pl. 3: pl. 278. 1840.

Bergia texana Seub. ex Walp. Rep. 1: 285. 1842.

Plants scabrous and somewhat glandular, the stems diffusely branching from the base, ascending, 1-3 dm. long, scabrous and slightly glandular. Leaves opposite, obovate or those at the tips of the branches ovate, narrowed to a petiole, 5-20 mm. long, sharply serrate; flowers 1 or 2 in the axils, short-pedicelled; sepals acuminate, scarious-margined, 3-4 mm. long; petals a little shorter.

Moist ground, Sonoran Zones; Sacramento and San Joaquin Valleys to Lake Elsinore, southern California, east to Nevada, Texas, and Illinois. Type locality: Texas. June-Nov.

Family 96. **FRANKENIACEAE.**

FRANKENIA FAMILY.

Low perennial herbs or undershrubs. Leaves opposite, sessile and often united at the membranous and somewhat sheathing base, entire, often revolute. Stipules none. Flowers small, perfect, solitary, and sessile in the axils of the branches. Calyx 4-5-lobed, the tube tubular or prismatic, furrowed, the lobes short, valvate. Petals 4 or 5, borne on the edge of the calyx-tube, narrowed to a claw bearing an appendage on its inner face. Stamens 4-7, or rarely more, borne on the edge of the calyx-tube. Pistil of 2-4 carpels united into a 1-celled ovary with 2-4 parietal placentae. Styles 2-4-cleft into filiform lobes. Fruit a capsule, invested by the persistent calyx. Seeds few to many, on slender funiculi attached to the margin of the valves, the testa crustaceous; endosperm present, farinose.

A family of 4 genera and about 65 species, warm temperate and tropical regions.

1. *FRANKÈNIA* L. Sp. Pl. 331. 1753.

Characters of the family. [Name in honor of J. Franke (Frankenius), professor of anatomy and botany, Upsala, seventeenth century.]

A genus of about 60 species, natives of warm, temperate, and tropical regions of both hemispheres. Type species, *Frankenia laevis* L.

Styles 3-cleft; ovules numerous; herbs.

Styles 2-cleft; ovules 2 or 3; shrubby plants.

1. *F. grandifolia*.

2. *F. Palmeri*.

1. *Frankenia grandifolia* Cham. & Sch. Alkali Heath or Yerba Reuma. Fig. 3244.

Frankenia grandifolia Cham. & Sch. Linnaea 1: 35. 1826.

Velezia latifolia Eschsch. Mém. Acad. St. Pétersb. 10: 286. 1826.

Frankenia latifolia Presl ex Schultes f. Syst. Veg. 7: 1620. 1830.

Stem much branched from a slightly woody base, erect or reclining, slender, 1-3 dm. high, pubescent to nearly glabrous. Leaves many, obovate to oblanceolate, plane or revolute, 6-12 mm. long, dull green; calyx-tube cylindric, 6 mm. long, strongly furrowed, the lobes short, acute; petals spatulate, deep rose, exerted beyond the calyx-tube 2-4 mm., appendages of the claws bifid; stamens 4-7; style 3-cleft; capsule shorter than the calyx, linear, angled; seeds numerous.

Salt marshes, near the coast, Transition and Sonoran Zones; Marin County, California, to northern Lower California and Guadalupe Island. Type locality: salt marshes, San Francisco, California. May-Nov.

Frankenia grandifolia var. *campéstris* A. Gray, Syn. Fl. N. Amer. 1: 208. 1895. More compactly branched and tufted, 1-4 dm. high. Leaves narrowly oblanceolate to linear-spatulate, strongly revolute, 4-8 mm. long, pale green; petals smaller, exerted 1-2 mm. beyond calyx, pale rose or white. Moist alkaline soils of the interior valleys, Sonoran Zones; Sacramento Valley to Inyo and Riverside Counties, California, and southern Nevada. Type locality: plains near San Jacinto, Riverside County, California.

Frankenia pulverulenta L. Sp. Pl. 332. 1753. Stems much branched, spreading, herbaceous, slender, 10-25 cm. long. Leaves broadly ovate to broadly spatulate, rounded at the apex, scarcely revolute, 3-5 mm. long, scurfy-puberulent beneath; calyx-tube 2.5 mm. long, grooved; petals little exceeding the calyx, rose. Adventive from southern Europe, ballast, Portland, Oregon.

2. *Frankenia Palmeri* S. Wats. Palmer's Frankenia or Yerba Reuma. Fig. 3245.

Frankenia Palmeri S. Wats. Proc. Amer. Acad. 11: 124. 1876.

Low shrub with slender spreading or creeping branches, 1-3 dm. high, the branchlets short and divaricate. Leaves numerous, fascicled, strongly revolute, appearing nearly terete, 2-4 mm. long, canescent with a short papillose pubescence; calyx-tube 3 mm. long; petals linear, 1.5 mm. long, white or tinged with pink; stamens 4; style 2-cleft; seeds 1-3.

Salt marshes, Lower Sonoran Zone; San Diego, California, south to Lower California. Type locality: "Lower California, on the gulf side." May-Aug.

Family 97. TAMARICACEAE.

TAMARISK FAMILY.

Shrubs or suffrutescent plants, rarely small trees or perennial herbs. Leaves alternate, small and usually scale-like, entire. Stipules none. Flowers usually in racemose spikes or solitary and terminal or axillary. Sepals 4-5, distinct, or united at base. Petals 4-5, inserted under the edge of the hypogynous disk, distinct. Stamens 4 to many, borne on the disk. Ovary superior, 1-celled with 3-5 parietal placentae. Styles 3-5. Ovules anatropous, few to many. Fruit a capsule, dehiscent by valves, coriaceous. Seeds erect, often beaked and bearing long plumose hairs; endosperm present or none.

A family of 4 genera and about 100 species, native of the Old World.

1. *TAMARIX* L. Sp. Pl. 270. 1753.

Shrubs or small trees, with minute scale-like evergreen or deciduous leaves. Flowers white or rose, minute, borne profusely in spikes or dense racemes on lateral branchlets. Sepals and petals usually 4 or 5, rarely 6. Stamens 5 or 10, rarely 4 or 12, distinct or the filaments connate at base. Ovary and capsule attenuate at apex. Seeds many, bearing long plumose hairs; endosperm none. [Name from Tamaris, a river in Spain.]

A genus of about 80 species, inhabiting Europe, Asia, and Africa. Type species, *Tamarix gallica* L.

Flowers 4-merous; racemes lateral on last year's branchlets.

1. *T. parviflora*.

Flowers 5-merous; racemes in usually large terminal panicles, rarely a few scattered laterally on the branchlets of the season.

2. *T. pentandra*.

1. *Tamarix parviflora* DC. Small-flowered Tamarisk. Fig. 3246.

Tamarix parviflora DC. Prod. 3: 97. 1828.

Shrub or small tree, 2-3 m. high, densely branching with slender arching branchlets. Leaves scale-like, ovate, acuminate, about 1.5-2 mm. long, green, deciduous; the densely flowered slender racemes 2-3 cm. long, lateral on last year's branches; flowers 1-2 mm. long, appearing before the leaves, the subtending bracts about as long or a little surpassing the pedicels; petals 4, spreading; sepals 4, rarely 3; styles 3, less than one-half the length of the ovary; capsule 3-4 mm. long.

Widely cultivated in California and well established as an escape from Lake County south to southern California. Native of southeastern Europe and central Asia. April-May. This and the next are confused frequently with the French Tamarisk, *Tamarix gallica* L.

2. *Tamarix pentandra* Pall. Five-stamened Tamarisk. Fig. 3247.

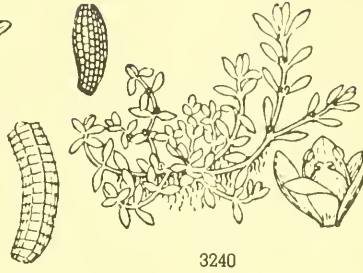
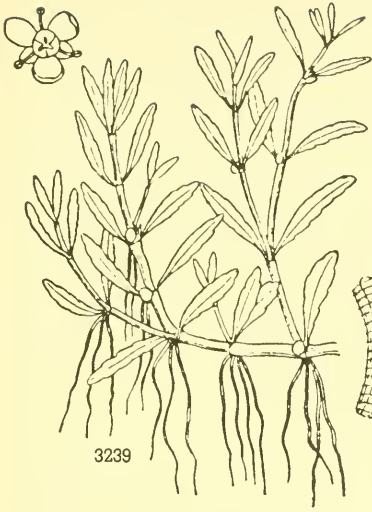
Tamarix pentandra Pall. Fl. Ross. 1: 72. 1788.

Tamarix Pallasii Desv. Ann. Sci. Nat. 4: 349. 1825.

Shrub or becoming a small tree in age, with glabrous often purplish branches. Leaves lanceolate to ovate-lanceolate, scale-like, pale glaucous-green; racemes arranged in large panicles terminating the branches, or rarely a few racemes scattered along the branches of the season, densely flowered, 2-4 cm. long; bracts ovate to lanceolate, about as long as or slightly exceeding the pedicels; flowers pink, petals 5, narrowly elliptic-oblong, barely 2 mm. long; disk 5-lobed the lobes emarginate; styles usually 3.

A native of western Asia and southeastern Europe frequently cultivated in southern California, Nevada, and Arizona; and often growing spontaneously in the interior and desert regions. March-April.

Tamarix articulata Vahl, Symb. Bot. 2: 48. pl. 32. 1791. Athel or Tamarisk Salt Tree. Tree with a



3239. *Elatine triandra*
 3240. *Elatine americana*
 3241. *Elatine brachysperma*

3242. *Elatine californica*
 3243. *Bergia texana*
 3244. *Frankenia grandifolia*

3245. *Frankenia Palmeri*
 3246. *Tamarix parviflora*
 3247. *Tamarix pentandra*

bushy or often conical crown, the branchlets numerous, very slender, divided into short articulate joints, pale glaucous-green. Leaves minute and cusp-like; flowers in slender racemes forming panicles, 5-merous. A native of western Asia frequently planted as a windbreak in the Sacramento and San Joaquin Valleys and in southern California, especially in the desert regions, but seldom growing spontaneously. The branchlets exude a salt that forms encrustations, hence the name.

Family 98. CISTACEAE.

ROCKROSE FAMILY.

Shrubs or low woody plants, with alternate or opposite simple leaves. Flowers regular, generally perfect, solitary, clustered, racemose, or paniculate. Sepals 3 or 5, persistent; when 5 the outer ones smaller and bract-like, the inner 3 convolute. Petals 3 or 5 or sometimes none, fugacious. Stamens many, hypogynous. Pistil 1; ovary sessile, 1- to several-celled; style 1; stigma entire or 3-lobed; ovules orthotropous, attached by a slender funiculus. Fruit a capsule, dehiscent by valves. Seeds several to many; embryo slender; endosperm present, farinose.

A family of 8 genera and about 150 species of wide geographical distribution.

1. HELIANTHEMUM [Tourn.] Mill. Gard. Dict. abr. ed. 4. 1754.

Low shrubs or perennial herbs with woody bases. Leaves alternate, simple, and entire. Flowers all alike, with rather showy yellow petals, or of two sorts, showy petal-bearing ones, and small apetalous cleistogamous ones. Sepals 5, the 2 outer smaller. Petals 5, yellow, fugacious. Stamens numerous. Carpels 3; ovary with 3 parietal placentae or false partitions. [Name Greek, from two words meaning sun and flower.]

A genus of about 70 species of wide geographical distribution. The Pacific States species belong to the section *Spartioides*, characterized by the broom-like habit, and the absence of cleistogamous flowers. Type species, *Helianthemum Chamæcistus* Mill.

Inflorescence puberulent, not glandular.

Petals 4-6 mm. long; plants 2-3 dm. high.

Petals 8-12 mm. long; plants 3-8 dm. high.

Inflorescence glandular-pubescent.

1. *H. scoparium*.

2. *H. Aldersonii*.

3. *H. Greenei*.

1. *Helianthemum scoparium* Nutt. Common Rush-rose. Fig. 3248.

Helianthemum scoparium Nutt. in Torr. & Gray, Fl. N. Amer. 1: 152. 1838.

Halimium scoparium Gross. Pflanzenreich 4¹⁰³: 35. 1903.

Crocianthemum scoparium Millsp. Field Mus. Bot. Ser. 5: 175. 1923.

Low tufted plant with many spreading branches from a woody crown, 2-3 dm. high, minutely stellate-pubescent. Leaves narrowly linear, 1-3 cm. long, canescent with a close stellate pubescence or glabrate; flowers solitary in the axils of the upper leaves, pedicelled, forming a leafy-bracted, few-flowered terminal raceme; pedicels 3-6 mm. long; inner sepals ovate-lanceolate, 4-5 mm long, stellate-pubescent or glabrate, the outer shorter and narrowly linear; petals broadly obovate, 8-10 mm. long.

Dry, usually sandy rocky soils, along the coast, Humid Transition Zone; Mendocino County to Monterey County, California, and also on Santa Cruz Island. Type locality: "Dry hills around Monterey." Dec.-Sept.

Helianthemum scoparium var. *vulgare* Jepson, Man. Fl. Pl. Calif. 641. 1925. Branches strictly erect and broom-like. Leaves narrowly linear, early deciduous, those of the paniculate inflorescence reduced to small bracts; outer sepals 3-4 mm. long. Dry hillsides, mainly in chaparral, Upper Sonoran Zone; Coast Ranges from Lake County to San Diego County; also in the foothills of the Sierra Nevada, California. Type locality: Coulterville, Mariposa County, California.

Helianthemum suffrutescens Schreiber, Madroño 5: 81. fig. 1. 1939. Suffrutescent, 4-8 dm. high, virgately branched at base, rather densely leafy, canescent throughout with a short stellate-pubescent. Leaves linear-lanceolate to oblanceolate, densely stellate-pubescent, persistent; flowers paniculate, leafy-bracted; petals about 6 mm. long. Dry slopes, Upper Sonoran Zone; vicinity of Bisbee Peak and Michigan Bar, Amador County, California. This recently discovered, apparently local, species would seem to be quite distinct, especially from *Helianthemum scoparium* var. *vulgare* Jepson, which is the other representative of the genus in the Sierra Nevada foothills. Type locality: Bisbee Peak.

2. *Helianthemum Aldersonii* Greene. Alderson's Rush-rose. Fig. 3249.

Helianthemum Aldersonii Greene, Erythea 1: 259. 1893.

Halimium Aldersonii Standley, Contr. U.S. Nat. Herb. 23: 832. 1923.

Crocianthemum Aldersonii Janchen in Engler & Prantl, Nat. Pflanzenf. ed. 2. 21: 305. 1925.

Helianthemum scoparium var. *Aldersonii* Munz, Man. S. Calif. Bot. 316. 1935.

Low plant with a woody base and erect broom-like branches 5-8 dm. high. Leaves linear, or the lower sometimes narrowly oblanceolate, 2-6 cm. long, pale green and glabrate or somewhat stellate-pubescent; inflorescence paniculate or somewhat corymbose-paniculate; peduncles in the axils of small bracts; inner sepals 5-6 mm. long; petals 8-12 mm. long.

Dry rocky or sandy soils, Upper Sonoran Zone; interior valleys and foothills of cismontane southern California, Cajon Pass to San Diego County, California, and adjacent Lower California. Type locality: mountains of the southern borders of San Diego County, California, among rocks in hard, sterile granitic soil. Feb.-July.

3. *Helianthemum Greenei* Robinson. Island Rush-rose. Fig. 3250.

Helianthemum occidentale Greene, Bull. Calif. Acad. 2: 144. 1886. Not Nym. 1878.

Helianthemum Greenei Robinson in A. Gray, Syn. Fl. N. Amer. 1st: 191. 1895.

Crocianthemum occidentale Janchen in Engler & Prantl, Nat. Pflanzenf. ed. 2. 21: 305. 1925.

A much-branched suffrutescent plant with a woody base, 3–5 dm. high, canescent on the leaves and stems with a stellate-hirsute pubescence, branches of the inflorescence and calyx with simple glandular-villous wine-colored hairs. Lower leaves oblanceolate, the others linear, 10–25 mm. long; inflorescence corymbose-branched; inner sepals 6–7 mm. long, villous or glandular-villous; petals broadly ovate, 8–10 mm. long; capsule ovoid, 5 mm. long.

Dry rocky ridges, Upper Sonoran Zone; Santa Cruz Island, California. Type locality: "on a dry summit near the central part of the island of Santa Cruz." Usually associated with *H. scoparium*, and apparent hybrids occur having the open corymbose inflorescence and large flowers of *H. Greenei*, but the whole plant densely canescent with stellate-hirsute pubescence and lacking the simple glandular hairs on the inflorescence. April–July.

Family 99. VIOLACEAE.

VIOLET FAMILY.

Herbs or some tropical species shrubs, with alternate or basal simple stipulate leaves. Flowers solitary or clustered, perfect and mostly irregular. Sepals 5, equal or unequal. Petals 5, hypogynous, imbricated in the bud, the lower often larger or spurred. Stamens 5, hypogynous; filaments short or none; anthers erect, connivent or syngenesious. Ovary solitary, 1-celled, with 3 parietal placentae; style simple.



3248. *Helianthemum scoparium*
3249. *Helianthemum Aldersonii*

3250. *Helianthemum Greenei*
3251. *Viola Douglasii*

3252. *Viola Beckwithii*
3253. *Viola Hallii*

Fruit a capsule, dehiscent by valves. Seeds anatropous, with a crustaceous testa; embryo straight; endosperm copious.

A family of 15 genera and about 300 species, of wide geographical distribution.

1. VIOLA* [Tourn.] L. Sp. Pl. 933. 1753.

Herbs, with scattered or basal leaves, or some tropical species arborescent. Flowers often of two sorts, the ordinary petaliferous, which are followed later in the season by cleistogamous ones that are usually very fertile. Petals 5, the lowest one usually larger and spurred. Stamens 5, the two lowest with appendages projecting into the spur of the lower petal. [The ancient Latin name.]

A genus of about 200 species of wide geographical distribution. Type species, *Viola odorata* L.

Flowers yellow, or if of some other color, at least with yellow centers; lateral petals with a tuft of very short clavate hairs at base (naked in *V. Sheltonii*); stems well developed. (*Chamaemelum*)

Leaves divided.

Lateral petals with a tuft of short clavate hairs at base.

Upper petals yellow on the inner surface, brownish purple on the back, the others yellow.

1. *V. Douglasii*.

Upper petals violet-purple, the others various.

Leaves pubescent with short spreading hairs, at least on the margins.

2. *V. Beckwithii*.

Leaves glabrous.

Lobes of the leaves not 3-nerved nor coriaceous.

3. *V. Hallii*.

Lobes of the leaves prominently 3-nerved, becoming coriaceous.

4. *V. trinervata*.

Lateral petals glabrous, and all of them pale yellow.

5. *V. Sheltonii*.

Leaves entire, or variously toothed or lobed (*V. lobata*).

Inner surface of petals yellow except for dark veining.

Stems erect, the lower internodes much elongated, the leaves and flowers therefore mostly crowded at the apex.

Upper petals brown on the outer surface; leaves palmately lobed except in the subspecies.

6. *V. lobata*.

Upper petals yellow on the outer surface as well as the inner.

7. *V. glabella*.

Stems erect or prostrate, the lower internodes not pronouncedly longer than the upper, the flowers and leaves therefore appearing scattered along the stem.

Leaves distinctly cordate at base; plants often stoloniferous.

Stems stoloniferous; leaves dark green above, brownish-punctate on both surfaces.

8. *V. sempervirens*.

Stems not stoloniferous; leaves bright green above, not brownish-punctate.

9. *V. orbiculata*.

Leaves not cordate at base or sometimes obscurely so in *V. pedunculata*.

Rootstock deep-seated, with slender elongated offshoots; inner surface of petals with brownish patch at base.

10. *V. pedunculata*.

Rootstock shallow, the flowering stems arising directly from the usually simple crown.

Ovary glabrous or very sparsely pubescent; upper petals not brownish purple on the back.

Leaves more or less toothed, more or less pubescent; petals bright yellow, often fading purplish on the back, 12-18 mm. long.

11. *V. praemorsa*.

Leaves entire, glabrous or slightly puberulent; petals light yellow, not purplish on the back, 8-10 mm. long.

12. *V. Bakeri*.

Ovary more or less densely puberulent; upper petals dark brownish purple on the back.

13. *V. purpurea*.

Inner surface of petals purple or blotched with purple and white, yellow only at center.

Flowers purple and white.

Plants glabrous; petals mainly purple, bordered with white; leaves cuneate at base; stipules herbaceous.

14. *V. cuneata*.

Plants more or less pubescent; leaves cordate; stipules scarious.

Stipules fimbriate; inner surface of lateral petals blotched with purple, the others white.

15. *V. ocellata*.

Stipules entire; inner surface of all the petals white, purple only on the back.

16. *V. canadensis*.

Flowers violet on both surfaces; plants glabrous.

17. *V. Flettii*.

Flowers blue, violet, or white, never yellow; lateral petals with a tuft of very slender elongated hairs at base.

(*Nominium*)

Plants with evident, erect or ascending stems, not stoloniferous (stems short and often horizontal in

V. simulata).

Head of style bearded; flowers normally violet, rarely white.

Leaves and corolla-spur longer than broad.

Petals 4-5 mm. long, white at base or about to the middle and purple-veined; plants very dwarf, almost stemless.

18. *V. bellidifolia*.

Petals rarely less than 10-15 mm. long, blue-violet throughout or rarely with a little white at base.

19. *V. adunca*.

Leaves and corolla-spur as broad as long.

20. *V. Howellii*.

Head of style naked; petals violet, the lower three often white at base.

21. *V. Langsdorffii*.

Plants stemless or producing creeping stolons.

Plants not stoloniferous; rootstocks thick and fleshy; flowers violet.

22. *V. nephrophylla*.

Plants producing slender stolons; rootstocks slender.

Leaves ovate-cordate.

Flowers normally blue; leaves distinctly crenate, glabrous.

23. *V. palustris*.

Flowers white with purple veins; leaves entire or obscurely and remotely crenate.

24. *V. Macloskeyi*.

Leaves elliptic; flowers white.

25. *V. occidentalis*.

* See Appendix for résumé on the recent work of Milo S. Baker on *Viola*.

1. *Viola Douglásii* Steudel. Douglas' or Golden Violet. Fig. 3251.

Viola chrysantha Hook. Ic. Pl. 1: pl. 49. 1837. Not Schrad. 1834.

Viola Douglasii Steudel, Nom. ed. 2. 771. 1841.

Plants 5–14 cm. high, the stems mainly subterranean from short deep-seated rootstalks. Leaves bipinnatifid, 2–5 cm. long, the segments linear or linear-oblong, light green, more or less hirsutulous with short spreading hairs, especially on the margins; petioles 5–10 cm. long; peduncles equaling or surpassing the leaves; petals 12–18 mm. long, orange-yellow, the lateral and lower purple-veined, the two upper brownish purple on the back; capsule 6–8 mm. long, acute.

Dry open slopes, usually in gravelly soils, Upper Sonoran and Arid Transition Zones; Josephine County to Klamath County, Oregon, south through the Inner Coast Ranges and the foothills of the Sierra Nevada to the Cuyamaca Mountains, California. Type locality: California. Collected by Douglas. March–May.

2. *Viola Beckwithii* Torr. & Gray. Beckwith's or Great Basin Violet. Fig. 3252

Viola Beckwithii Torr. & Gray, Pacif. R. Rep. 2: 119. pl. 1. 1855.

Plants low, 3–10 cm. high, the stems mainly subterranean, arising from short rootstocks. Leaves palmately biternate or triternate, 2–4 cm. broad, minutely pubescent with short, stiff spreading hairs, especially on the margins, the lobes linear or linear-oblong, obtuse and callous-tipped; peduncles usually surpassing the leaves; petals 10–15 mm. long, the upper two deep violet, the others pale violet with a yellow base, the lateral ones bearded on the claw with short, clavate hairs; the stigma-head retrorsely bearded.

Moist, stony ground, Upper Sonoran Zone; Wallowa Mountains, Oregon, southward east of the Cascade-Sierra Nevada divide to Inyo County, California, eastward through the Great Basin region to Utah; in the Klamath Basin, extending westward to Siskiyou County, California. Type locality: "On the slopes of a mountain between Great Salt Lake and the Sierra Nevada." March–May.

3. *Viola Hállii* A. Gray. Hall's Violet. Fig. 3253.

Viola Hallii A. Gray, Proc. Amer. Acad. 8: 377. 1872.

Plants low, 5–10 cm. high, glabrous, the stems mainly subterranean arising from a short deep-seated rootstock. Leaves 3–4 cm. long, oblong-ovate in outline, pinnately twice divided into linear-oblong callous-apiculate acutish lobes; peduncles mostly surpassing the leaves; petals 8–12 mm. long, the two upper deep violet, the other pale yellow or white, veined with purple, the lateral ones bearded on claw with short clavate hairs.

Open grassland, in light gravelly soils, mainly Transition Zone; Willamette Valley, Oregon, to Mendocino and Trinity Counties, California. Type locality: Salem, Oregon. March–June.

4. *Viola trinervata* Howell. Sagebrush or Howell's Violet. Fig. 3254.

Viola chrysantha var. *glaberrima* Torr. Bot. Wilkes Exped. 238. 1874.

Viola Beckwithii var. *trinervata* Howell, Bot. Gaz. 8: 207. 1883.

Viola trinervata Howell, Bot. Gaz. 11: 290. 1886

Plant low, 5–8 cm. high, glabrous, the stems mainly underground from a short deep-seated rootstock. Leaves pedately parted, the segments lanceolate to lanceolate-ovate, acute, becoming firm in age and distinctly 3-nerved, the lateral nerves marginal; peduncles usually longer than the leaves; petals 12–15 mm. long, the upper pair dark violet, the others varying from pale violet to white, with a yellow base; capsule 7–8 mm. long, obtuse.

Dry hillsides, usually in gravelly soils, Upper Sonoran Zone; eastern Washington from the Grand Coulee southward, east of the Cascade Mountains to Sherman County and eastern Malheur County, Oregon. Type locality: near Goldendale, Klickitat County, Washington. March–May. Three-nerved Violet.

5. *Viola Sheltonii* Torr. Shelton's Violet. Fig. 3255.

Viola Sheltonii Torr. Pacif. R. Rep. 4: 67. pl. 2. 1856.

Plants 8–20 cm. high, from slender elongated and rather deep-seated rootstocks. Leaves suborbicular in outline, 3–5 cm. broad, palmately biternate, the divisions cuneate at base, the ultimate lobes oblong, rounded at apex, glabrous or sparsely puberulent with short stout hairs; peduncles shorter or surpassing the leaves; petals yellow, veined with brownish purple, 10–12 mm. long, beardless; capsule 7–8 mm. long.

On moist banks or in open woods, usually in partial shade, Arid Transition Zone; Klickitat County, Washington, Klamath Basin and Rogue River, Oregon, southward through the Sierra Nevada to the San Bernardino Mountains, California. Type locality: Yuba River, California. March–June.

6. *Viola lobata* Benth. Yellow Wood or Pine Violet. Fig. 3256.

Viola lobata Benth. Pl. Hartw. 298. 1848.

Viola sequoiensis Kell. Proc. Calif. Acad. 2: 185. 1863.

Viola dactylifera Greene, Pittonia 3: 317. 1898.

Viola psychodes Greene, op. cit. 318.

Plants arising from rather shallow simple or branching rootstocks, the herbage glabrous and more or less glaucous, varying to rather thickly puberulent, 8–20 cm. high. Basal leaves with slender petioles about as long as the lower internode of the stem, the leaf-blades reniform to ovate, 3–8 cm. broad, usually cordate at base, more or less deeply lobed or parted into 3 to several divisions; stipules herbaceous or even foliaceous, entire, toothed or laciniate; peduncles

seldom surpassing the leaves; petals 12–18 mm. long, yellow, the upper ones brown on the outer surface; capsule 8–10 mm. long, acutish, glabrous.

Open coniferous forests, Transition Zone; Jackson and Josephine Counties, Oregon, southward through the North Coast Ranges and the Sierra Nevada to the Cuyamaca Mountains, California. Type locality: northern Sierra Nevada. April–June.

Viola lobata var. *integrifolia* S. Wats. Bot. Calif. 1: 57. 1876. (*Viola deltoidea* Greene, Pittonia 3: 317. 1898.) Leaves ovate-deltoid, irregularly toothed but not lobed, complete intergradation with the typical species is evident in the North Coast Ranges of California. Siskiyou Mountains, southern Oregon, to the North Coast Ranges, California; also in the Cuyamaca Mountains, San Diego County, California. Type locality: not given.

7. *Viola glabëlla* Nutt. Stream or Smooth Yellow Violet. Fig. 3257.

Viola glabella Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 142. 1838.

Plants bright green and glabrous or sparsely puberulent, arising from branching horizontal scaly rootstocks, the stems ascending or erect, 7–30 cm. high. Basal leaves reniform-cordate, 3–8 cm. broad, crenate-serrate, long-petioled; stem-leaves similar, usually exceeding their short petioles; stipules small, membranous; peduncles 2–4 cm. long; petals pale yellow, 8–14 mm. long, the lower and lateral ones purple-veined, the lateral pubescent on the claw, with short clavate hairs; spur saccate, 2–3 mm. long; capsule 8–10 mm. long, oblong, abruptly beaked.

Moist banks usually in deep shade, mainly Transition Zones; southern Alaska southward through the Coast Ranges to Monterey County, California; Cascade Mountains south to Tulare County, California, in the Sierra Nevada and eastward to northern Idaho and Montana. Type locality: "Shady woods of the Oregon [Columbia River]." March–July.

8. *Viola sempervirens* Greene. Evergreen or Redwood Violet. Fig. 3258.

Viola sarmentosa Dougl. ex Hook Fl. Bor. Amer. 1: 80. 1830. Not Bieber. 1808.

Viola sempervirens Greene, Pittonia 4: 8. 1899.

Plants arising from slender rootstocks, glabrous or very sparsely pubescent, the stems slender, prostrate and stoloniferous. Leaves broadly ovate-cordate to round-cordate, 2–4 cm. broad, finely crenate-serrate, becoming rather firm and persistent, dark green above, brownish-punctate on both surfaces, especially in age, sparsely pubescent on the veins with pointed appressed hairs; stipules lanceolate, brown-scarious; peduncles well surpassing or the latter about equaling the leaves; petals yellow, 8–12 mm. long, finely purple-veined; spur saccate, 2–3 mm. long; capsule ovoid, 6–7 mm. long, obtuse, smooth.

Moist wooded banks, mainly Humid Transition Zone; western British Columbia southward mainly west of the Cascade Mountains to the California Coast Ranges, reaching the southern limit in Monterey County. Type locality: "Hilly wooded places near Fort Vancouver [Vancouver, Washington]." March–June.

9. *Viola orbiculàta* Geyer. Western Round-leaved Violet. Fig. 3259.

Viola orbiculata Geyer ex Hook. Lond. Journ. Bot. 6: 73. 1847, as a synonym.

Viola sarmentosa var. *orbiculata* A. Gray, Syn. Fl. N. Amer. 1^a: 199. 1895.

Viola orbiculata Howell, Fl. N. W. Amer. 70. 1897.

Viola sempervirens var. *orbiculata* Henry, Fl. S. Brit. Columbia 208. 1915.

Rootstocks rather stout, short, 2–5 cm. long, never stoloniferous and creeping. Leaves thinner than in *sempervirens*, reniform-cordate, 2–5 cm. wide, rather finely crenate-serrate, bright green and glabrous or sparsely short-pubescent above, pale beneath and not brownish-punctate; petioles glabrous; peduncles a little surpassing or often shorter than the leaves; petals 8–12 mm. long, yellow and purple-veined, the lateral ones little or not at all bearded; spur short-saccate; later cauline flowers often cleistogamous; capsule glabrous or obscurely scabrous.

Canyons and moist coniferous woods, mainly Canadian Zone; southern British Columbia south in the Cascade Mountains to Crater Lake and also to the Blue and Wallowa Mountains, Oregon, east to northern Idaho and western Montana. Type locality: Coeur d'Alene Mountains, Idaho. May–July.

10. *Viola pedunculàta* Torr. & Gray. California Golden Violet. Fig. 3260.

Viola pedunculata Torr. & Gray. Fl. N. Amer. 1: 141. 1838.

Plants arising from deep-seated tuber-like rootstocks, stems branching at the surface of the ground and ascending, 10–35 cm. high. Leaves broadly ovate-deltoid, 2–3 cm. broad, mostly truncate at base, shallowly crenate, sparsely pubescent; stipules narrowly lanceolate, herbaceous; peduncles 6–12 cm. long, erect, much surpassing the leaves; petals broad, 12–18 mm. long, golden yellow, the upper pair brown on the back, the others purple-veined, the lateral with short clavate hairs on the claws; capsule broad, ovoid.

Grassy hillsides, Upper Sonoran Zone; California Coast Ranges and southern Sierra Nevada, from Napa and Tulare Counties to San Diego County and adjacent Lower California. Type locality: probably near Monterey, originally collected by Douglas. Feb.–May. Yellow Pansy, Johnny-jump-up.

11. *Viola prae mòrsa* Dougl. Astoria Violet. Fig. 3261.

Viola prae morsa Dougl. ex Lindl. Bot. Reg. 15; pl. 1254. 1829.

Viola Nuttallii subsp. *prae morsa* Piper, Contr. U.S. Nat. Herb. 11: 393. 1906.

Plants arising from rather short vertical rootstocks, when young flowering from the base, the stems elongating tardily, at length with two or three short internodes, ascending or decumbent, 5–20 cm. long, more or less densely villous. Lower leaves long-petioled, rather densely villous especially on the petioles, the blades ovate-elliptic, 4–8 cm. long, entire or usually shallowly crenate; peduncles shorter than or surpassing the leaves; flowers lemon-yellow, the petals rather narrowly oblong-obovate, 12–15 mm. long, the lateral with a tuft of short clavate hairs

on the inner surface, the lower veined with brownish purple; capsule very sparsely pubescent or usually entirely glabrous.

Open prairies and slopes, mainly Humid Transition Zone; Pierce and Klickitat Counties, Washington, southward west of the Cascade Mountains to Humboldt and Trinity Counties, California. Type locality: along the lower Columbia River. Collected by Douglas. April-June.

Viola praemorsa var. *linguae-folia* (Nutt.) M. E. Peck, Man. Pl. Oregon 486. 1941. (*Viola linguae-folia* Nutt. in Torr. & Gray, Fl. N. Amer. 1: 141. 1838; *Viola Nuttallii* subsp. *linguae-folia* Piper in Piper & Beattie, Fl. S. E. Wash. 166. 1914.) Plants sparsely retrorsely pubescent; petioles usually well elongated, the blades often well elongated, entire or remotely and shallowly toothed. Kittitas County, eastern Washington to northeastern Oregon and east to Wyoming and Colorado. Type locality: "Kamas Prairie, near the sources of the Oregon."

Viola praemorsa var. *major* (Hook.) M. E. Peck, loc. cit. (*V. Nuttallii* var. *major* Hook. Fl. Bor. Amer. 1: 79. 1830.) Stems more elongate, up to 20 cm. long, sparsely short-villous or glabrate. Leaves narrowly to rather broadly ovate, 4-8 cm. long, somewhat undulate crenate-dentate, both sides more or less pubescent, the long petiole slightly winged; sepals acute; capsules puberulent. Spokane County, Washington, and adjacent Idaho, southward east of the Cascade Mountains to the Blue Mountains of Oregon and to northeastern California. Type locality: "Abundant under the shade of pines on the dry sandy plains of the Columbia."

Viola praemorsa var. *oregona* Baker & Clausen ex M. E. Peck, loc. cit. Stems short and tufted; under surface of the leaves, petioles and peduncles more or less densely hirsute; leaves more numerous and the blades smaller, lanceolate to ovate, 2-4 cm. long, entire to irregularly sinuate-toothed; petals smaller, about 1 cm. long. Dry ground in open woods, Arid Transition Zone; southern Klamath County, Oregon, to the vicinity of Yreka, Siskiyou County, California. Type locality: southern Klamath County.

12. *Viola Bakeri* Greene. Baker's Violet. Fig. 3262.

Viola Bakeri Greene, Pittonia 3: 307. 1899.

Plants with a deep-seated vertical woody taproot giving rise at the crown to 1 to several short subligneous caudices, glabrous or usually minutely retrorse-puberulent or pubescent. Leaves oval to oblong-lanceolate, 2.5-3.5 cm. long, usually much shorter than the petioles, entire or sometimes the margins slightly undulate, both surfaces similar, rather indistinctly veined; flowers shorter than or little surpassing the leaves, light yellow, the lower veined with purple, 8-12 mm. long, the upper not purplish on the back.

Open ground, usually flowering where snow has recently melted, Boreal Zones; Cascade Mountains, Lane County, Oregon, south to the Siskiyou Mountains and Eldorado County, California. Type locality: Bear Valley, Shasta County, California.

13. *Viola purpurea* Kell. Mountain Violet. Fig. 3263.

Viola purpurea Kell. Proc. Calif. Acad. 1: 56. 1855.

Plants from shallow rootstocks usually with several stems from the same crown, the herbage more or less pubescent with retrorsely spreading pubescence, and usually tinged with purple, the stems ascending, 8-30 cm. high. Lower leaves broadly to narrowly ovate, obtuse at apex, usually truncate or subcordate at base, 2-4 cm. long, irregularly serrate-dentate, upper leaves narrower and usually more pubescent; stipules at least the upper foliaceous, oblong-lanceolate, lacerate or dentate; peduncles scattered in the upper axils, well surpassing the leaves; flowers yellow, 15-18 mm. broad; upper petals brown on the back, the lateral purple-veined and bearded at the top of the claw, the lower purple-veined; capsule ovoid, pubescent.

Open coniferous forest in dry gravelly soils, Arid Transition Zone; Siskiyou Mountains, southern Oregon southward through the Coast Ranges and the Sierra Nevada to southern California. Type locality: Placerville, California. April-June.

Viola purpurea var. *pinetorum* Greene, Fl. Fran. 243. 1891. (*Viola pinetorum* Greene, Pittonia 2: 14. 1889; *V. purpurea* var. *grisea* Jepson, Fl. Calif. 2: 521. 1936.) Leaves ovate-lanceolate to linear-lanceolate, irregularly and sinuate-dentate to lacerate or subentire, canescent with a dense retrorse-spreading pubescence. This subspecies replaces the typical species in the higher altitudes, occupying the Boreal Zones of the central and southern Sierra Nevada and extending to the high peaks of the southern California ranges. Type locality: "Pine woods of the higher mountains south of Tehachapi," Kern County, California.

Viola purpurea var. *aurea* (Kell.) M. S. Baker ex Jepson, Fl. Calif. 2: 521. 1936. (*Viola aurea* Kell. Proc. Calif. Acad. 2: 185. fig. 54. 1862.) Leaves especially the lower surface more or less densely white-woolly-pubescent, broadly ovate to ovate-lanceolate, irregularly crenate-dentate, pale sage-green. Eastern base of the Sierra Nevada from Plumas County, southward to the edges of the Mojave Desert, and eastward into western Nevada. In the Mojave Desert the pubescence becomes more like that of variety *pinetorum* and the two varieties intergrade or hybridize freely. Type locality: western Nevada, probably near Reno.

Viola purpurea var. *venosa* (S. Wats.) Brainerd, Bull. Vt. Agr. Exper. Sta. No. 224: 111. 1921. (*Viola Nuttallii* var. *venosa* S. Wats. Bot. King Expl. 35. 1871; *V. atriplicifolia* Greene, Pittonia 3: 38. 1896; *V. venosa* Rydb. Mem. N.Y. Bot. Gard. 1: 262. 1900; *V. purpurea* var. *geophyta* M. E. Peck, Man. Pl. Oregon 486. 1941.) Herbage not canescent, minutely and rather thinly pubescent. Leaves broadly ovate, entire or usually coarsely and irregularly dentate. Montane and mainly confined to the Boreal Zones; British Columbia southward through eastern Washington and Oregon to northeastern California, eastward to Montana and Colorado. Type locality: near snow line, Humboldt Mountains, Nevada.

14. *Viola cuneata* S. Wats. Wedge-leaved Violet. Fig. 3264.

Viola cuneata S. Wats. Proc. Amer. Acad. 14: 290. 1879.

Plants from rather deep-branching rootstocks, glabrous throughout, the stems slender, ascending, 6-25 cm. high. Basal leaves rhombic-ovate, often broader than long, 2-4 cm. long, crenate-serrate, abruptly acute at apex, abruptly attenuate at base; petioles elongated, very slender; stem-leaves narrower, cuneate at base, their petioles much shorter; stipules herbaceous, entire; peduncles mostly not surpassing the leaves; petals all purple on the back, 8-12 mm. long, the upper pair deep purple bordered with white, the lateral paler or whitish with a large deep purple spot, very sparsely bearded or naked, the lower veined with dark purple.

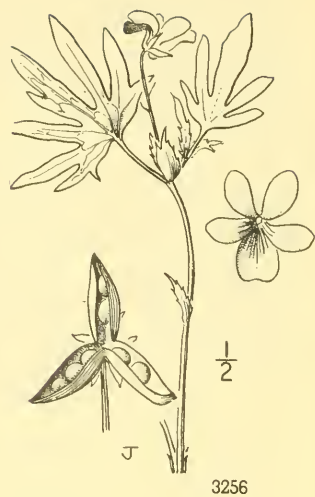
Rocky soils, especially in serpentine, Transition Zones; Curry and Josephine Counties, Oregon, to Trinity



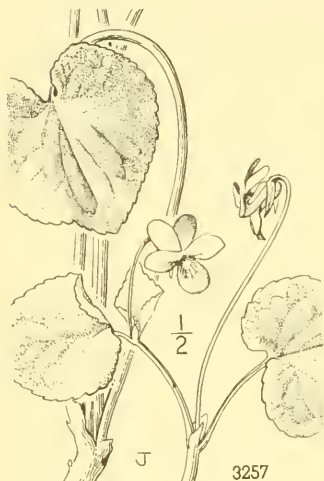
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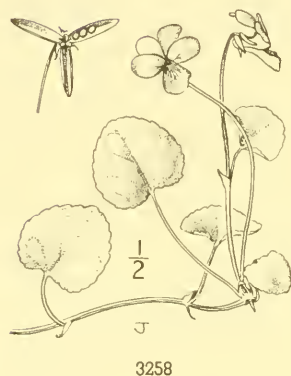
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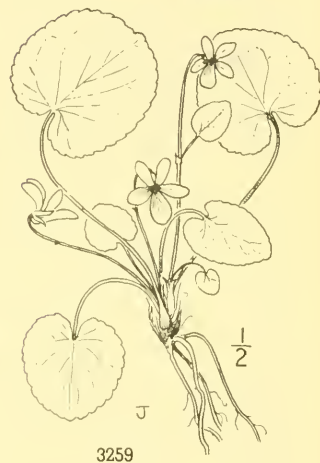
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3254. *Viola trinervata*
 3255. *Viola Sheltonii*
 3256. *Viola lobata*

3257. *Viola glabella*
 3258. *Viola sempervirens*
 3259. *Viola orbiculata*

3260. *Viola pedunculata*
 3261. *Viola praemorsa*
 3262. *Viola Bakeri*

and Mendocino Counties, California. Type locality: "high ridge south of Trinity River," Humboldt County, California. April-June. Northern Two-eyed Violet, Butterfly Violet.

15. *Viola ocellata* Torr. & Gray. Two-eyed Violet. Fig. 3265.

Viola ocellata Torr. & Gray, Fl. N. Amer. 1: 142. 1838.

Plants from rather slender deep-seated rootstocks, sparsely pubescent with short stout spreading hairs, the stems erect or ascending, 10-30 cm. high. Basal leaves cordate, 3-7 cm. long, acute, crenate-serrate, the upper shallowly cordate or truncate at base; stipules scarious, glandular-fimbriate; flowers in the upper axils; peduncles mostly shorter than the leaves; petals 10-15 mm. long, the two upper white on the inner surface and deep violet on the back, the two lateral white or yellow with a large purple spot at base on the inner surface, the lower petal purple-veined; capsule puberulent with short papillate hairs.

Wooded slopes, mainly Humid Transition Zone; Douglas County, Oregon, southward through the Coast Ranges to Monterey County, California. Type locality: California, collected by Douglas. March-June. Pinto Pansy.

16. *Viola canadensis* L. Canada Violet. Fig. 3266.

Viola canadensis L. Sp. Pl. 936. 1753.

Plants from rather stout rootstocks, glabrous or sparsely short-pubescent, erect, 2-4 dm. high. Leaves broadly ovate, cordate, acute or acuminate, serrate; stipules scarious, lanceolate-subulate; peduncles solitary in the axils of the stem-leaves and not surpassing them; sepals subulate; inner surface of petals white with bright yellow spots at base, the outside of the upper pair purple, the others veined with purple, the lateral pair bearded; capsule ovoid, puberulent.

Moist woods, Transition and Boreal Zones; British Columbia and northeastern Washington to New Brunswick, Virginia, New Mexico, and Arizona. Type locality: Canada. May-July.

17. *Viola Fléttii* Piper. Olympic or Rock Violet. Fig. 3267.

Viola Fléttii Piper, Erythea 6: 69. 1898.

Plant from a rather deep-seated slender rootstock, glabrous, the stems slender, ascending, 6-15 cm. high. Basal leaves on elongated slender petioles, broadly reniform, 2.5-4 cm. broad, closely crenate-serrate, purple-veined; stem-leaves similar but small and short-petioled; stipules scarious, lanceolate, attenuate, entire; peduncles about equaling the leaves; sepals glabrous or minutely puberulent; petals all lavender-violet, tinged with yellow at base, 12-14 mm. long; the lateral pair papillose-bearded at base of the blade.

Rock crevices, Boreal Zones; Olympic Mountains, Washington. Type locality: near Mount Constance. July-Aug.

18. *Viola bellidifolia* Greene. Daisy-leaved Violet. Fig. 3268.

Viola bellidifolia Greene, Pittonia 4: 292. 1901.

Plants very dwarf, not over 2-5 cm. high, glabrous throughout, rootstock erect, short, the leafy stems very short. Leaves broadly ovate, subcordate to broadly cuneate at base, 8-15 mm. long, shallowly and rather remotely crenate; peduncles equaling or well exceeding the leaves; sepals oblong, acute; petals white at base or about to the middle and purple-veined; deep blue-violet above, 4-5 mm. long, the lateral pair bearded near the base, spur rather stout, equaling or a little shorter than the blade.

Wet meadows, Boreal Zones, Cascade, Paulina, and Wallowa Mountains, Oregon, east to Idaho, Wyoming, Utah, and Colorado. Closely related to *Viola adunca* and possibly not specifically distinct. Type locality: "Slide Rock Canyon, west of Mt. Hesperus," Colorado. June-Aug.

19. *Viola adunca* J. E. Smith. Western Dog Violet. Fig. 3269.

Viola adunca J. E. Smith in Rees, Cycl. 37: no. 63. 1817.

Viola canina var. *adunca* A. Gray, Proc. Amer. Acad. 8: 377. 1872.

Plants from a slender branching rootstock, glabrous or usually puberulent, the stems scarcely perceptible to 25 cm. long, ascending, sometimes decumbent but not rooting. Basal leaves ovate to round-ovate, cordate to subtruncate at base, 2-3 cm. long, crenate with low broad teeth; petioles slender, 2-8 mm. long; stem-leaves similar, with shorter petioles; stipules herbaceous, commonly lacerate, peduncles well exceeding the leaves; flowers violet-blue; petals 1-1.5 cm. long, obovate, the lateral with a tuft of slender hairs at the base of the blades; spur narrow, straight or often hooked at tip, about half as long as the blades.

Meadows and slopes, Boreal and Transition Zones; widespread over the northern part of North America. In the Pacific States it is found on both sides of the Cascade Mountains, ranging from sea level to near the snow line and extending southward to central California along the coast and to southern California in the mountains. This is a polymorphic species of which many segregates have been proposed. Type locality: West Coast of North America. April-July. Hooked-spur Violet.

Viola adunca subsp. *oryceras* (S. Wats.) Piper, Contr. U.S. Nat. Herb. 11: 395. 1906. (*Viola canina* var. *oryceras* S. Wats. Bot. Calif. 1: 56. 1876; *V. oryceras* Greene, Pittonia 3: 255. 1897; *V. adunca* var. *oryceras* S. Wats. ex Jepson, Man. Fl. Pl. Calif. 647. 1925.) Corolla-spur more slender usually straight and pointed. This is the common subspecies of the Cascade Mountains of southern Oregon and extends through the Sierra Nevada to the San Bernardino Mountains, California. Type locality: Yosemite Valley and Donner Pass, California.

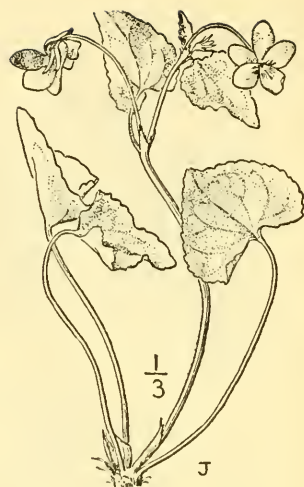
Viola adunca var. *uncinulata* (Greene) Applegate, Amer. Midl. Nat. 22: 282. 1939. (*Viola uncinulata* Greene, Leaflets Bot. Obs. 2: 97. 1910.) Plants glabrous; peduncles very slender almost filiform. Leaves broadly ovate; petals rather narrowly oblong; spur very slender, distinctly curved or uncinulate at the tip, one-half to two-thirds as long as the blade. Mountain meadows, Boreal Zones; Cascade Mountains of Oregon from



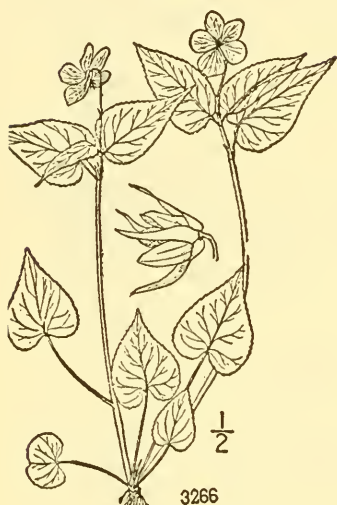
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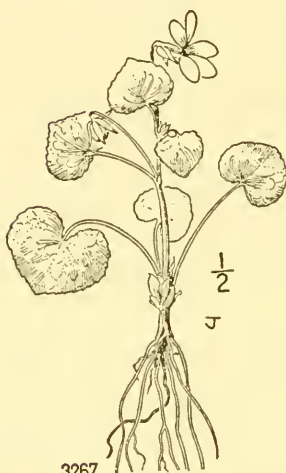
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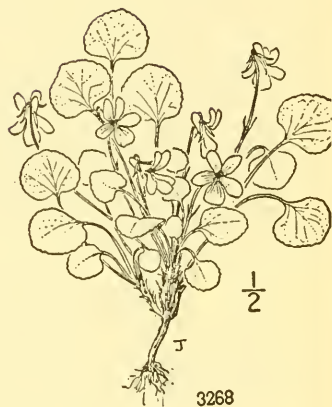
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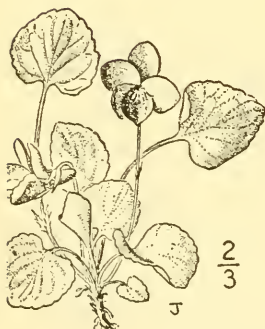
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3263. *Viola purpurea*
 3264. *Viola cuneata*
 3265. *Viola ocellata*

3266. *Viola canadensis*
 3267. *Viola Flettii*
 3268. *Viola bellidifolia*

3269. *Viola adunca*
 3270. *Viola Howellii*
 3271. *Viola Langsdorfii*

Deschutes County to Crater Lake. These plants closely resemble the subspecies *oxyceras*, and possibly represent only an alpine phase of it. Type locality: Crater Lake, Oregon.

20. *Viola Howéllii* A. Gray. Howell's Violet. Fig. 3270.

Viola Howéllii A. Gray, Proc. Amer. Acad. 22: 318. 1887.

Plants from slender elongated branching rootstocks, the stems slender ascending, 5–20 cm. long. Leaves round-cordate or reniform, 2–4 cm. broad, rather thin, sparsely pubescent on the veins and short ciliate-pubescent on the margins; petioles glabrous or pubescent, all but the uppermost well elongated; stipules herbaceous, remotely fimbriate and ciliate; peduncles surpassing the leaves; flowers blue or white, 12–15 mm. long, the lateral pair with a tuft of slender hairs at the base, shorter than the petals, and as broad as long.

Moist ground, mainly Humid Transition Zone; western British Columbia, southward west of the Cascade Mountains to Jackson County, extending east to Klamath Lake (flowers white) and along the coast to Mendocino County, California. Type locality: Portland, Oregon. March–July.

21. *Viola Langsdórfii* Fischer. Langsdorf's Violet. Fig. 3271.

Viola Langsdórfii Fischer ex DC. Prod. 1: 296. 1824.

Plants from rather stout creeping rootstocks, glabrous, the stems ascending, 5–30 cm. long. Leaves long-petioled, round-cordate, 2.5–4 cm. broad, crenate; stipules foliaceous, lanceolate, the lower usually incised; flowers pale violet; petals 12–16 mm. long, the three lower white at base, the lateral pair bearded; spur very short and stout, as broad as long; head of styles not bearded.

Swamps usually near the coast, Boreal and Humid Transition Zones; Aleutian Islands to central Oregon, where it extends inland to Marion County. Type locality: Unalaska. The Alaskan and Aleutian specimens are more robust with the petals 20 mm. long. June–July. Alaska Violet.

Viola superba M. S. Baker, Madroño 5: 220. 1940. (*Viola simulata* var. *caulescens* M. S. Baker ex M. E. Peck, Man. Pl. Oregon 484. 1941.) Plants glabrous throughout, stems erect or ascending, 2–25 cm. long, roots adventitious in older plants and somewhat woody, stolons wanting. Leaves 3–5 cm. long and approximately as broad, broadly ovate to round-ovate, deeply cordate at base with a rather narrow sinus; stipules ovate to lanceolate, entire, becoming scarious; peduncles stout, 5–15 cm. long; corolla violet-purple, about 2.5 cm. broad; petals rounded, the lateral ones bearded at base; spur 2 mm. long and about as broad, cream-colored; style unusually stout, bearded at apex. Bogs near Brookings, Josephine County, Oregon, the type locality. This species is closely related to the more northern *Viola Langsdórfii*, and may not be specifically distinct.

Viola simulata M. S. Baker, Madroño 3: 237. pl. 11. 1936. Very similar to *Viola Langsdórfii*, differing in its very short horizontal stems that appear as an annual elongation of the branching rootstock, in its relatively narrower petals and especially in its larger stigmas. The two species together with *Viola superba* may belong to the same species complex, but detailed genetic studies are needed to determine their relationship. Type locality: Shawnigan Lake, Vancouver Island.

22. *Viola nephrophylla* Greene. Northern Bog Violet. Fig. 3272.

Viola nephrophylla Greene, Pittonia 3: 144. 1896.

Viola cognata Greene, op. cit. 145.

Viola Austiniae Greene, Pittonia 5: 30. 1902.

Viola subjuncta Greene, op. cit. 31.

Plants stemless, with stout rather fleshy rootstocks, not stoloniferous, glabrous throughout. Leaves long-petioled, broadly cordate to reniform, 2–5 cm. broad, shallowly crenate; stipules lanceolate, acute; peduncles elongated usually equaling or surpassing the leaves; sepals ovate-lanceolate; flowers violet; petals 10–15 mm. long, the lateral and lower strongly bearded with slender hairs; capsule oblong 7–10 mm. long, glabrous.

In springy places, mainly Boreal Zones, widely distributed from British Columbia to Quebec south to Wisconsin, Colorado, Arizona, and southern California. In the Pacific States mainly east of the Cascade Mountains in Washington and Oregon and the Sierra Nevada Mountains to southern California. Type locality: the valley of the Cimarron River, Colorado. April–June.

23. *Viola palustris* L. Marsh Violet. Fig. 3273.

Viola palustris L. Sp. Pl. 934. 1753.

Plant from creeping rootstocks, producing runners, glabrous. Leaves round-cordate, 2–4 cm. broad, crenate, long-petioled; stipules ovate, acuminate; peduncles surpassing the leaves; flowers pale violet, rarely white; petals 10–12 mm. long, the lateral pair bearded; spur short and strongly saccate; capsules oblong. 7–8 mm. long.

Swamps, Boreal and Humid Transition Zones; widely distributed over northern North America and Europe. On the Pacific Coast it grows in bogs along the coast and in the Cascade Mountains, from Alaska to the coast of Mendocino County, California. Type locality: Europe. April–Aug.

24. *Viola Macloskeyi* Lloyd. Macloskey's Violet. Fig. 3274.

Viola Macloskeyi Lloyd, Erythra 3: 74. 1895.

Viola blanda var. *Macloskeyi* Jepson, Man. Fl. Calif. 648. 1925.

Viola anodonta Greene, Pittonia 5: 32. 1907.

Plants from slender creeping rootstocks, at length producing stolons. Leaves sparsely pubescent or rarely glabrous, suborbicular to broadly ovate, shallowly cordate at base, 2–3.5 cm. broad, entire or remotely and obscurely crenate, thin and light green; peduncles exceeding the leaves; minutely bibracteolate below the middle; sepals oval, obtuse; petals obovate, 6–8

mm. long, white, the lower veined, the lateral pair with a tuft of slender hairs at the base of the blade; spur very short.

Wet bogs, Transition and Boreal Zones; British Columbia southward through the Pacific States to southern California. Type locality: at the base of Mount Hood, Oregon. June-Aug. Western Sweet White Violet.

25. *Viola occidentalis* (A. Gray) Howell. Western Violet. Fig. 3275.

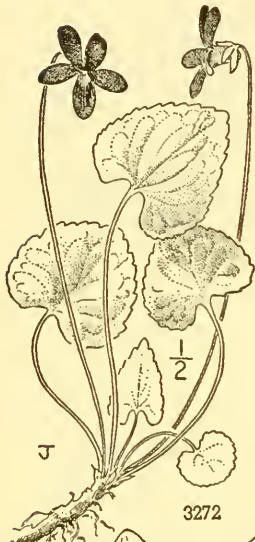
Viola primulaefolia var. *occidentalis* A. Gray, Bot. Gaz. 11: 255. 1886.

Viola occidentalis Howell, Fl. N.W. Amer. 1: 69. 1897.

Plants acaulescent, glabrous throughout, arising from short rootstocks, producing elongated very slender runners. Leaves ovate to oblong-spatulate, narrowed to a long slender petiole, obscurely and remotely crenate; peduncles 8-15 cm. long, mostly shorter than the leaves; petals white, the lower veined with purple, 8-12 mm. long, the lateral pair bearded with slender hairs; spur short, saccate.

Bogs and swamps, Transition Zone; Josephine County, Oregon, to Del Norte County, California. Type locality: Waldo, Oregon. April-June. Western Water Violet.

Viola lanceolata L. Sp. Pl. 934. 1753. Eastern Water Violet. Plants glabrous throughout, stems very short, the leaves and peduncles appearing as arising from the slender, creeping, and diffusely branching stolons. Leaves lanceolate to elliptic, the blades 5-10 cm. long, 1-2 cm. wide, gradually narrowed into the margined petioles, shallowly and often obscurely crenate; peduncles reddish, about as long as the leaves; sepals lanceolate, acuminate, 4-6 mm. long; petals white, the lower three veined with purple, 6-8 mm. long; cleistogamous flowers borne on shorter peduncles; capsules ellipsoid, remaining green. This species of the eastern United States, has become well established in Washington in marshes and cranberry bogs near the mouth of the Columbia River in Pacific County and in marshlands near Tacoma and Roy, Pierce County. Type locality: eastern North America.

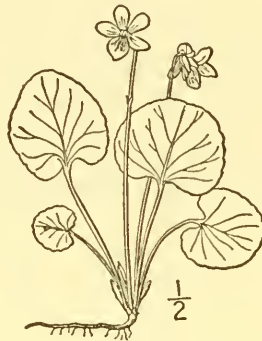


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3272. *Viola nephrophylla*
3273. *Viola palustris*

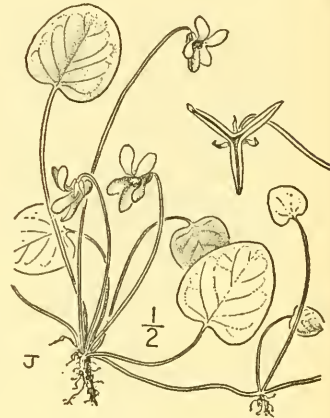


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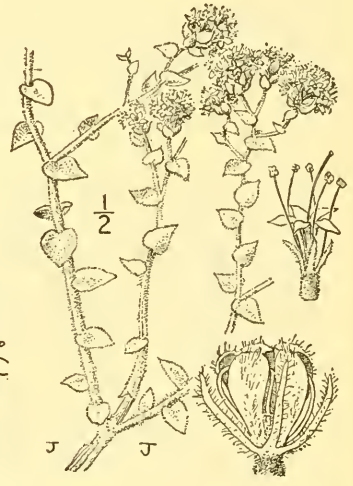


3276

3274. *Viola Macloskeyi*
3275. *Viola occidentalis*



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3277

3276. *Petalonyx Thurberi*
3277. *Petalonyx Gilmanii*

Family 100. **LOASACEAE.****LOASA FAMILY.**

Erect, climbing herbs, often clothed with barbed, stinging or viscid hairs. Leaves alternate or opposite, without stipules. Flowers racemose or cymose, regular and perfect. Hypanthium adnate to the ovary, turbinate to cylindric. Sepals 4-5, imbricate or convolute. Petals 4-5 or apparently 10, yellow or red. Stamens 5 to many, usually arranged in clusters opposite the petals; outer filaments sometimes dilated or becoming staminodia and passing into petals; anthers introrse, longitudinally dehiscent. Ovary 1-celled (rarely 2-3-celled), with 2-5 parietal placentae; styles slender, entire or 2-3-lobed. Ovules anatropous. Fruit a capsule; seeds solitary or usually numerous, with scanty endosperm.

About 15 genera and 250 species, all but one, natives of North America.

Stamens 5; seed solitary.

1. *Petalonyx*.

Stamens many; seeds several to many.

Style entire or 3-cleft; ovary with 3 placentae.

2. *Mentzelia*.

Style 5-cleft; ovary with 5 placentae.

3. *Eucnide*.

1. **PETALÓNYX** A. Gray, Mem. Amer. Acad. 5: 319. 1854.

Low desert shrubs or at least woody at base, the stems brittle and the whole plant rough with barbed hairs. Leaves alternate, entire or toothed, petioled or sessile. Flowers in terminal spicate or head-like racemes. Hypanthium minute, cylindric. Sepals 5, linear, deciduous. Petals 5, with long very slender connivent claws and spreading blades. Stamens 5, the slender filaments protruding between the claws in bud up to the base of the overlapping blades which cover the anthers until anthesis. Ovary 1-celled; style entire, exserted; ovule solitary, pendulous. Capsule very small, irregularly dehiscent; seeds oblong, smooth. [Name Greek, meaning petal and claw.]

A genus of 4 species, natives of the arid southwestern United States and northern Mexico. Type species, *Petalonyx Thurberi* A. Gray.

Leaves sessile, dull and cinereous.

Leaves and young branches scabrous with short stiff hairs; bracts toothed at base.

1. *P. Thurberi*.

Leaves and young branches clothed with soft spreading villous hairs concealing the ones

2. *P. Gilmanii*.

Leaves petioled, shining.

Leaves round-ovate; bracts 7-8 mm. long.

3. *P. nitidus*.

Leaves oblong-lanceolate; bracts 5-7 mm. long.

4. *P. linearis*.

1. **Petalonyx Thurberi** A. Gray. Common Sandpaper Plant. Fig. 3276.

Petalonyx Thurberi A. Gray, Mem. Amer. Acad. 5: 319. 1854.

Stems with erect branches from a more or less woody base, 4-6 dm. high, retrorsely pubescent. Leaves ovate to linear-lanceolate, 1-2 cm. long, sessile and more or less clasping at base, entire or with a few teeth toward the base, gray-green on both surfaces with short, stiff barbed hairs; flowers in short dense spikes; bracts ovate, acuminate, toothed toward the base; petals light yellow, about 5 mm. long, hispid on the back; stamens about twice the length of the petals; capsule 2 mm. long.

Dry desert washes and hillsides, Lower Sonoran Zone; Mojave and Colorado Deserts, California, to southern Nevada, Arizona, Sonora and Lower California. Type locality: Valley of the Gila River, Arizona. Dec.-July.

2. **Petalonyx Gilmanii** Munz. Death Valley Sandpaper Plant. Fig. 3277.

Petalonyx Gilmanii Munz, Leaflets West. Bot. 2: 69. 1938.

Diffusely branched shrub, up to 1 m. high and about as broad, the short stiff barbed hairs concealed by interspersed longer spreading soft villous hairs both on the leaves and the young branches, older branches whitish with exfoliating papery bark. Leaves broadly ovate, cordate-clasping at base, those of the principal branches 1-2 cm. long, entire, acute or abruptly short-acuminate at apex; flowers in short dense terminal spikes; bracts thin, greenish becoming straw-colored in age, sessile, subcordate, 4-7 mm. long, pubescent with short stiff hairs; sepals membranous, linear-lanceolate, 2 mm. long, pubescent; petals white, 3-4 mm. long, pubescent on the back; stamens well exserted.

Desert washes, Lower Sonoran Zone; vicinity of Death Valley, Inyo County, California. Type locality: Ryan Wash, Death Valley. May-June.

3. **Petalonyx nitidus** S. Wats. Shining Sandpaper Plant. Fig. 3278.

Petalonyx nitidus S. Wats. Amer. Nat. 7: 300. 1873.

Petalonyx Thurberi var. *nitidus* M. E. Jones, Contr. West. Bot. No. 12: 16. 1908.

Low desert shrub, much branched, 25-45 cm. high, young branches short-pubescent and

rough. Leaves ovate to lanceolate, 15–25 mm. long, narrowed at base to a short petiole, usually crenate-serrate, rough scabrous, gray-green, but shining; flowers in bracted racemes; bracts long-acuminate; pedicels short; sepals subulate, membranous, 4–5 mm. long; petals about 1 cm. long, pale yellow; stamens but little exserted.

Sandy or rocky soils, Lower Sonoran Zone; Mojave Desert, in Inyo and San Bernardino Counties, California, to southern Nevada and northern Arizona. Type locality: southern Nevada. May–Aug.

4. *Petalonyx lineàris* Greene. Narrow-leaved Sandpaper Plant. Fig. 3279.

Petalonyx linearis Greene, Bull. Calif. Acad. 1: 188. 1885.

Bushy almost globose shrub, 15–30 cm. high, the branches light gray-green and scabrous. Leaves oblong-lanceolate, 1–2.5 cm. long, short-petioled; flowers in short capitate spikes that elongate in fruit; bracts broadly ovate, obtuse at apex, cordate at base, entire, 5–7 mm. long, densely pubescent; petals white, 2 mm. long; stamens but little exserted.

Rocky places, Lower Sonoran Zone; eastern Mojave Desert, California, to western Arizona southward in scattering localities to Lower California. Type locality: Cedros Island, Lower California. March–May.

2. MENTZELIA [Plumier] L. Sp. Pl. 516. 1753.

Herbs or some tropical species trees or shrubs, clothed with variously barbed hairs, the stems often white and shining. Leaves alternate or sometimes opposite, usually toothed or lobed. Flowers in terminal cymes, mostly yellow, subtended by bracts. Sepals 5, persistent or deciduous. Petals 5–10, imbricate, distinct or slightly united at base. Stamens numerous, distinct or united in clusters opposite the petals; filaments filiform or the outer petaloid; anthers introrse. Hypanthium cylindric, ovoid or turbinate; style 3-cleft; ovary 1-celled; ovules few to many, anatropous. Fruit capsular, 3–5-valved. Seeds smooth, striate or punctate; endosperm copious or sometimes scanty. [Name in honor of C. Mentzel, German botanist, seventeenth century.]

An American genus of about 60 species, most abundant in western North America. Type species, *Mentzelia aspera* L.

Outer filaments, when dilated not toothed at the apex, or obscurely so in *M. micrantha*.

Perennials or some winter annuals; placentae thick and fleshy or lamellate; seeds horizontal, in two or more series. (*Bartonia*)

Seeds numerous (50–80), flat and broadly winged.

Petals 5.

Petals lanceolate, acuminate, 1.5–5 cm. long.

Petals 5–8 cm. long; capsule 3–4 cm. long.

Petals 1.5–2 cm. long; capsule 1.5–2 cm. long.

Petals narrowly obovate, obtuse at the apex, 8–12 mm. long.

Sepals narrowly lanceolate, 6–8 mm. long; bracts linear.

Sepals ovate-lanceolate, 9–11 mm. long; bracts lanceolate.

Petals 10, the five inner being petaloid staminodia.

Seeds few (7–12), ovoid, merely angled.

Capsule erect in fruit.

Capsule on a strongly recurved pedicel.

Annuals; petals 5; filaments all filiform or subulate, or the outer sometimes somewhat dilated; seeds pendulous, in one series on the filiform placentae, minutely or conspicuously muriculate or tuberculate, not winged. (*Trachyphytum*)

Inflorescence not congested; bracts linear-lanceolate, not concealing the capsules.

Petals 15–40 mm. long; sepals 6–15 mm. long.

Petals 20–40 mm. long, yellow with vermilion spot at base.

Petals 15–25 mm. long, golden yellow throughout.

Petals 10 mm. or less in length.

Seeds prismatic or cubical, grooved on 3 angles, microscopically muriculate, appearing almost smooth to the naked eye; filaments all filiform.

Leaves deeply pinnatifid; petals 5–7 mm. long.

Leaves usually entire, rarely toothed; petals 2–5 mm. long.

Seeds irregularly angled or somewhat prismatic, grooved only on 1 angle or not at all, conspicuously muriculate.

Sepals 2–3 mm. long; petals 2–6 mm. long.

Petals 2–4 mm. long; seeds irregularly angled, not grooved on the angles.

Petals 4–6 mm. long; seeds usually truncate at one end and grooved on 1 angle.

Sepals 5–6 mm. long; petals about 10 mm. long.

Seeds somewhat prismatic and grooved on one angle; petals golden yellow throughout.

Seeds irregularly angled, none of the angles grooved; petals with a copper-colored spot at base.

Inflorescence congested; bracts ovate, concealing the capsules.

Bracts membranaceous; filaments filiform.

Bracts herbaceous; outer filaments dilated.

Outer filaments dilated and prolonged at apex into 2 blunt or cuspidate teeth with the anther in the sinus. (*Bicuspidaria*)

Bracts herbaceous, small, not concealing the flowers.

Bracts white, membranaceous, large and concealing the flowers.

1. *M. laevicaulis*.

2. *M. Brandegei*.

3. *M. puberula*.

4. *M. oreophila*.

5. *M. multiflora*.

6. *M. Torreyi*.

7. *M. reflexa*.

8. *M. Lindleyi*.

9. *M. nitens*.

10. *M. affinis*.

11. *M. dispersa*.

12. *M. albicaulis*.

13. *M. Veatchiana*.

14. *M. gracilentia*.

15. *M. pectinata*.

16. *M. congesta*.

17. *M. micrantha*.

18. *M. tricuspis*.

19. *M. involucreta*.

1. *Mentzelia laevicaulis* (Dougl.) Torr. & Gray. Blazing Star. Fig. 3280.

Bartonia laevicaulis Dougl. ex Hook. Fl. Bor. Amer. 1: 221. pl. 69. 1834.

Mentzelia laevicaulis Torr. & Gray, Fl. N. Amer. 1: 535. 1840.

Touitrea laevicaulis Rydb. Bull. Torrey Club 30: 276. 1903.

Nuttallia laevicaulis Greene, Leaflets Bot. Obs. 1: 210. 1906.

Perennial, the stems stout, erect, 3–10 dm. high, branched above. Leaves lanceolate, sinuate-toothed, 5–15 cm. long, canescent with short appressed hairs; flowers sessile on short branches, diurnal; bracts linear-subulate, irregularly toothed, long-acuminate; sepals lanceolate, 2–4 cm. long, reflexed in fruit; petals 5, or sometimes apparently 10 on account of the 5 petaloid staminodia, yellow, oblong-lanceolate, 5–8 cm. long; stamens numerous, in several series; capsule cylindric, 3 cm. long; seeds winged, minutely tuberculate.

Gravelly or sandy plains and washes, Arid Transition and Upper Sonoran Zones; eastern Washington and Montana south to Utah, Nevada, and southern California. Type locality: "on the gravelly islands and rocky shores of the Columbia near the Great Falls." June–Sept.

2. *Mentzelia Brandegei* S. Wats. Brandege's Stick-leaf. Fig. 3281.

Mentzelia Brandegei S. Wats. Proc. Amer. Acad. 20: 367. 1885.

Touitrea Brandegei Rydb. Bull. Torrey Club 30: 276. 1903.

Nuttallia Brandegei Greene, Leaflets Bot. Obs. 1: 210. 1906.

Perennial or biennial, from a simple root, stems erect, branched, 2–3 dm. high, scabrous. Leaves linear-lanceolate, 2–5 cm. long, the lower petioled, the upper sessile, sinuate-pinnatifid with linear lobes, scabrous on both surfaces; flowers corymbose, sessile, 1–3, terminating the branches; bracts narrow, usually entire; sepals 3–4 cm. long, densely pubescent; petals 5, yellow, 15–20 mm. long, lanceolate, acuminate, pilose; stamens 20–35, the outer 5 petaloid and alternating with the petals; capsule narrowly oblong-cylindric, 15–20 mm. long; seeds narrowly winged.

Sandy soils, Arid Transition and Upper Sonoran Zones; eastern British Columbia south to Yakima County, Washington. Type locality: "Near the Simcoe Mountains on the mesa bordering Satus Creek." June–Aug.

3. *Mentzelia puberula* Darlington. Darlington's Stick-leaf. Fig. 3282.

Mentzelia puberula Darlington, Ann. Mo. Bot. Gard. 21: 177. 1934.

Mentzelia Peirsonii Jepson, Fl. Calif. 2: 529. 1936.

Perennial, 15–25 cm. high, the stems widely branching from the base, white, short-hirsute. Basal leaves broadly oblanceolate, narrowed to a slender petiole, the upper sessile, oblong-oval to ovate, irregularly dentate, grayed with a dense scabrous puberulence; flowers terminating the numerous branches, pedicellate; bracts narrowly linear-lanceolate; sepals narrowly lanceolate, revolute, 6–8 mm. long; petals 5, narrowly obovate, 8–10 mm. long, rounded at apex, distinctly clawed at base; 5 outer filaments spatulate, rounded or slightly notched at apex, antheriferous, the inner linear; capsule turbinate-campanulate, scabrous; seeds broadly winged, faintly punctate.

Desert ranges, Sonoran Zones; eastern Mojave Desert and Colorado Desert, California, to western Arizona and northern Lower California. Type locality: Kane Springs, Ord Mountains, San Bernardino County, California. Feb.–April.

4. *Mentzelia oreophila* Darlington. Argus Stick-leaf. Fig. 3283.

Mentzelia oreophila Darlington, Ann. Mo. Bot. Gard. 21: 175. 1934.

Perennial from a stout lignescent root, the stems 1–2 dm. high, scabrous becoming smooth and white. Leaves few, sessile, lanceolate to ovate-lanceolate, attenuate at base, 2–6 cm. long, the upper smaller, irregularly sinuate-dentate, scabrous, the pale green epidermis evident between the short whitish hairs; flowers borne on the ends of the branches; bracts linear; sepals ovate-lanceolate, 9–11 mm. long, reflexed in fruit; petals 5, narrowly obovate, 10–12 mm. long, yellow, glabrous; outer filaments dilated, rounded or slightly notched at the apex; capsule oblong-ovoid, 8–10 mm. long, pedicelled, short-hirsute; seeds numerous, broadly winged and minutely punctate.

Rocky mountain slopes, Sonoran Zones; desert ranges of Inyo and eastern San Bernardino Counties, California, and adjacent Nevada and Arizona. Type locality: Argus Mountains, altitude 5,000 feet, Inyo County, California. This species is closely related to *Mentzelia leucophylla* Brandg. of Nevada, but that has the leaves thicker with strongly revolute margins and whitish gray with a dense covering of short stiff hairs. April–June.

5. *Mentzelia multiflora* (Nutt.) A. Gray. Yerba Amarilla. Fig. 3284.

Bartonia multiflora Nutt. Proc. Acad. Phila. 4: 23. 1848.

Mentzelia multiflora A. Gray, Mem. Amer. Acad. 4: 48. 1849.

Nuttallia multiflora Greene, Leaflets Bot. Obs. 1: 210. 1906.

Mentzelia longiloba Darlington, Ann. Mo. Bot. Gard. 21: 176. 1934.

Perennial from a stout taproot, the stems 4–8 dm. high, corymbosely branched, often smooth below, barbellate-pubescent above. Leaves linear-lanceolate, 2–8 cm. long, sessile, sinuate-dentate, scabrous on both surfaces with stiff barbate hairs; bracts linear, revolute; sepals subulate, 7–10 mm. long, spreading or reflexed in fruit; petals 10, oblong-obovate, rounded or obtuse at the apex, 15–20 mm. long; stamens numerous, filaments of the outer slightly dilated; capsule 15–20 mm. long, broadly oblong; seeds light brown, flat with broad wings.

Dry sandy plains, Sonoran Zones; Inyo County, California, to Colorado, and south to western Texas, Sonora, and Lower California. Type locality: "Sandy hills along the borders of the Rio del Norte, Santa Fe," New Mexico. April–Sept.



3278



3279



3280



3281



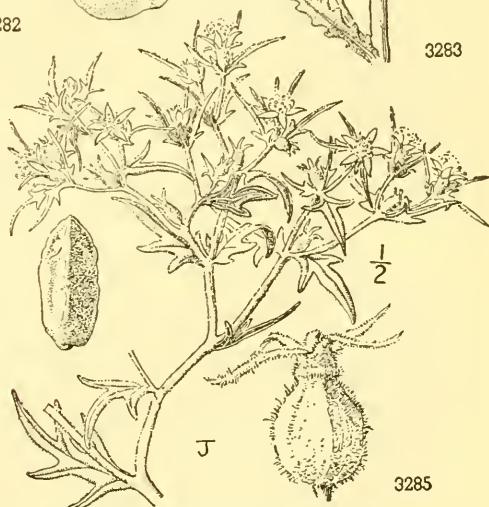
3282



3283



3284



3285

3278. *Petalonyx nitidus*
 3279. *Petalonyx linearis*
 3280. *Mentzelia laevicaulis*

3281. *Mentzelia Brandegei*
 3282. *Mentzelia puberula*
 3283. *Mentzelia oreophila*

3284. *Mentzelia multiflora*
 3285. *Mentzelia Torreyi*

6. *Mentzelia Torrèyi* A. Gray. Lava Stick-leaf. Fig. 3285.

Mentzelia Torrèyi A. Gray, Proc. Amer. Acad. 10: 72. 1874.

Mentzelia acerosa M. E. Jones, Contr. West. Bot. No. 17: 30. 1930.

Cespitose, 5–15 cm. high, the stems several from the crown of a perennial taproot, densely short-hispid, much branched. Leaves sessile, 2–3 cm. long, thick and firm, divided into 3–5 subulate spine-tipped lobes with revolute margins and prominent midribs; flowers solitary in the axils; sepals 5, subulate, 10 mm. long; petals yellow, spatulate to oblanceolate, 12–15 mm. long; stamens 25–30, all with filiform filaments; capsule ovoid-urceolate, 5–6 mm. long; seeds few, turgid, obscurely angled, slightly rugose, not winged.

Dry plains in volcanic or saline soils, Upper Sonoran Zone; southern Idaho south to Nevada and Mono County, California. Type locality: "Sterile saline plains, Humboldt County, Nevada. June–Sept.

7. *Mentzelia refléxa* Coville. Panamint Stick-leaf. Fig. 3286.

Mentzelia reflexa Coville, Proc. Biol. Soc. Wash. 8: 74. 1892.

Annual, hirsute with barbed hairs, the stems diffusely branching from the base, 5–15 cm. high. Lower leaves narrowly oblanceolate, petioled, 4–6 cm. long, the upper sessile or subsessile, broadly ovate, irregularly sinuate-dentate, densely short-hirsute beneath with barbed hairs, sparsely pubescent with stiff spine-like hairs above; flowers solitary in the upper forks of the branches, pedicelled; sepals subulate, 6–8 mm. long; petals 8, slightly exceeding the sepals, oblanceolate, acute; stamens 9–15, the filaments somewhat dilated above; style cleft one-third its length; capsule oblong-ovoid, 8–10 mm. long, reflexed on the short recurved pedicels; seeds 10–12, obovoid, angled and with rather deep transverse grooves on each face, muriculate.

Desert washes, Lower Sonoran Zone; Inyo and northern San Bernardino Counties, California. Type locality: Surprise Canyon, Panamint Mountains, California. April–June.

8. *Mentzelia Lindleyi* Torr. & Gray. Lindley's Blazing Star. Fig. 3287.

Bartonia aurea Lindl. Bot. Reg. 22: pl. 1831. 1836. Not *Mentzelia aurea* Nutt. 1818.

Mentzelia Lindleyi Torr. & Gray, Fl. N. Amer. 1: 533. 1840.

Acrolasia aurea Rydb. Bull. Torrey Club 30: 278. 1903.

Annual, the stems 1–6 dm. high, simple or branched. Leaves lanceolate to narrowly lanceolate, sessile, 4–10 cm. long, pectinately pinnatifid, terminal lobe elongated and acute, the lateral entire or toothed; flowers solitary or in 2–3-flowered clusters at the end of the branches; sepals 10–15 mm. long, narrowly lanceolate; petals obovate, 2–4 cm. long, abruptly rounded to a short acumination, golden yellow with a vermillion base; stamens numerous, outer filaments somewhat dilated at base, the others filiform; capsule 2–5 cm. long, linear-clavate, hirsute; seeds numerous, irregularly angled, minutely tuberculate.

Rocky or sandy hillsides and canyons, Upper Sonoran Zone; Inner Coast Ranges, central California. Type locality: California, collected by Douglas. May–Aug. Golden Bartonía.

Mentzelia Lindleyi subsp. *crócea* (Kell.) C. B. Wolf, Occ. Papers Rancho Santa Ana Bot. Gard. 1: 71. 1938. (*Mentzelia crócea* Kell. Proc. Calif. Acad. 7: 110. 1876.) Plant with leaves less pinnatifid than the species; petals ovate to narrowly obovate, tapering to the apex, the short acumination at the apex less pronounced than in the species. Sierra Nevada foothills from Tuolumne County to Tulare County, California. Type locality: Sierra Nevada foothills.

9. *Mentzelia nitens* Greene. Shining Stick-leaf. Fig. 3288.

Mentzelia nitens Greene, Fl. Fran. 234. 1891.

Acrolasia nitens Rydb. Bull. Torrey Club 30: 278. 1903.

Mentzelia Lindleyi var. *eremophila* Jepson, Man. Fl. Pl. Calif. 650. 1925.

Mentzelia Lindleyi var. *nitens* Jepson, Fl. Calif. 2: 534. 1936.

Annual, the stems branching from the base and more or less decumbent, 3–5 dm. high, white, smooth and shining. Leaves lanceolate, sessile, pinnatifid with linear lobes, or the uppermost entire, short-pubescent and scabrous; flowers in the upper axils and terminal; sepals lanceolate-acuminate, 6–10 mm. long; petals golden yellow throughout, obovate, 15–20 mm. long, rounded or emarginate at apex; stamens one-third to half as long as the petals, dilated at base; capsule, clavate-cylindric, 15–25 mm. long; seeds irregularly and sharply angled, tuberculate.

Sandy mesas and hillsides, Lower Sonoran Zone; Mono County, California, south to the Mojave Desert of southern California and adjacent Nevada and Arizona. Type locality: near Benton, Mono County, California. April–May.

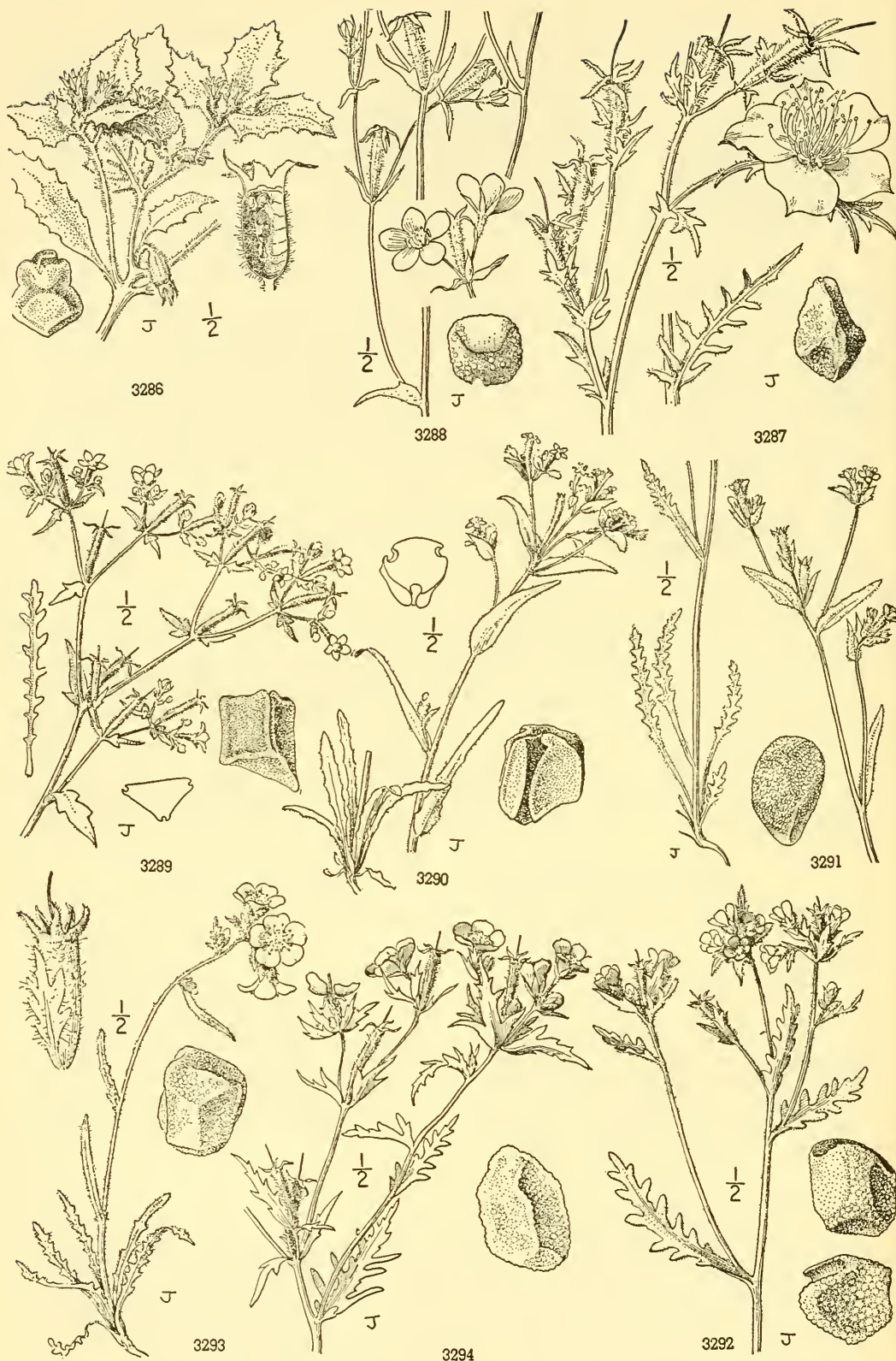
10. *Mentzelia affinis* Greene. Hydra Stick-leaf. Fig. 3289.

Mentzelia affinis Greene, Pittonia 2: 203. 1890.

Acrolasia affinis Rydb. Bull. Torrey Club 30: 278. 1903.

Annual, the stems branching from the base or simple below and branching above, 4–6 dm. high, white, shining, glabrous or minutely pubescent. Basal leaves oblanceolate, narrowed to a petiole, the cauline sessile, lanceolate, sinuate-pinnatifid; flowers scattered; bracts lanceolate-acuminate, entire or few-toothed below, shorter than the ovary; sepals, attenuate-subulate, 4–6 mm. long; petals yellow, 6–8 mm. long, obovate; stamens 25–40, filaments all filiform; capsule 15–20 mm. long, narrowly cylindric, hispid, the hairs short, stiff, and strongly pustulate at base; seeds short-cubical, grooved on the angles and minutely muriculate on the sides.

Sandy soils or rocky slopes, Sonoran Zones; San Joaquin Valley and the surrounding foothills to Orange County, California, east to western Arizona. Type locality: "Plains of the San Joaquin near Lathrop," California. April–June.



3286. *Mentzelia reflexa*
 3287. *Mentzelia Lindleyi*
 3288. *Mentzelia nitens*

3289. *Mentzelia affinis*
 3290. *Mentzelia dispersa*
 3291. *Mentzelia albicaulis*

3292. *Mentzelia Veatchiana*
 3293. *Mentzelia gracilentia*
 3294. *Mentzelia pectinata*

11. *Mentzelia dispérsa* S. Wats. Nada Stick-leaf. Fig. 3290.

Mentzelia albicaulis var. *integrifolia* S. Wats. Bot. King Expl. 114. 1871.

Mentzelia dispérsa S. Wats. Proc. Amer. Acad. 11: 137. 1876.

Acrolasia integrifolia Rydb. Bull. Torrey Club 30: 278. 1903.

Annual, the stems branching from the base, 3–6 dm. high, finely pubescent. Leaves pubescent, hardly scabrous, the basal oblanceolate, 3–6 cm. long, entire, the middle entire or saliently toothed, narrowly oblong-lanceolate to ovate-lanceolate, the upper entire, shorter and broader; flowers scattered; bracts broadly ovate to spatulate, entire, herbaceous; sepals 1–2 mm. long, subulate; petals yellow, 2–3.5 mm. long; capsule narrowly cylindric, 15–25 mm. long, densely pubescent; seeds cubical, grooved on the angles, muriculate on the sides.

Dry sandy or gravelly soils, Sonoran and Arid Transition Zones; eastern Washington to northern Lower California, east to Montana and Colorado. The species varies considerably, especially in leaf-form, and a number of segregates have been proposed: *Mentzelia pinctorum* Heller (Bull. S. Calif. Acad. 2: 69. 1903.); *Acrolasia montana* Davidson (Bull. S. Calif. Acad. 5: 18. 1906.); *Acrolasia desertorum* Davidson (op. cit. 16.). Type locality: East Humboldt Mountains, Nevada. May–Aug.

Mentzelia dispérsa var. *latifolia* (Rydb.) J. F. Macbride, Contr. Gray Herb. No. 56: 26. 1918. A more robust plant differing from the typical species chiefly in the larger flowers, the petals being 5–6 mm. long. Eastern Washington to central California, east of the Sierra Nevada. Type locality: mountains between Sunshine and Ward, Colorado.

12. *Mentzelia albicaulis* Dougl. White-stemmed Stick-leaf. Fig. 3291.

Bartonia albicaulis Dougl. ex Hook. Fl. Bor. Amer. 1: 222. 1834.

Mentzelia albicaulis Dougl. ex Hook. loc. cit., as a synonym; A. Gray, Smiths. Contr. 3⁵: 74. 1852.

Acrolasia albicaulis Rydb. Bull. Torrey Club 30: 277. 1903.

Annual, the stems 1–4 dm. high, slender, usually branched and decumbent at base, white, smooth and shining above, sparsely pubescent below. Leaves sessile, scabrous, the lower linear-lanceolate, 3–5 cm. long, the middle with linear lobes, the upper merely toothed or entire; flowers axillary, the lower solitary, the upper usually in clusters of three; sepals 2–2.5 mm. long; petals obovate, 3–4 mm. long, golden yellow and prominently veined; capsule narrowly cylindric, 10–15 mm. long; seeds irregularly angled, finely muriculate.

Dry sandy soils, Upper Sonoran Zone; eastern British Columbia east to Montana and Nebraska, south to Arizona and New Mexico; in the Pacific States east of the Cascade Mountains and the Sierra Nevada. Type locality: "On arid sandy plains of the river Columbia, under the shade of *Purshia tridentata*," Washington. June–Aug. Kuba.

13. *Mentzelia Veatchiana* Kell. Veatch's Stick-leaf. Fig. 3292.

Mentzelia Veatchiana Kell. Proc. Calif. Acad. 2: 99. 1861.

Acrolasia Veatchiana Rydb. Bull. Torrey Club 30: 278. 1903.

Mentzelia gracilenta var. *Veatchiana* Jepson, Man. Fl. Pl. Calif. 652. 1925.

Annual, the stems rather slender, branching, 3–6 dm. high, greenish or yellowish white, glabrous or sparsely puberulent. Basal leaves narrowly oblanceolate, narrowed at base to a petiole; the cauline sessile, lanceolate mostly sinuate-pinnatifid or toothed, or the uppermost usually entire; flowers in small clusters at the end of the branches; bracts herbaceous, ovate to lanceolate; sepals subulate, 2–3 mm. long; petals yellow, obovate, 4–6 mm. long, strongly veined; capsule slender, clavate-cylindric, 20–25 mm. long; seeds somewhat prismatic, grooved on one angle, conspicuously tuberculate.

Light sandy or gravelly soils, Sonoran Zones; southeastern Oregon to the deserts of southern California, east to Utah and Arizona. Type locality: vicinity of Virginia City, Nevada. April–Aug.

14. *Mentzelia gracilenta* Torr. & Gray. Slender Stick-leaf. Fig. 3293.

Mentzelia gracilenta Torr. & Gray, Fl. N. Amer. 1: 534. 1840.

Mentzelia albicaulis var. *gracilenta* S. Wats. Bot. King Expl. 151. 1871.

Acrolasia gracilenta Rydb. Bull. Torrey Club 30: 278. 1903.

Annual, the stems simple or sparingly branched, greenish or yellowish white, more or less pubescent especially above. Basal leaves narrowed to a petiole, the cauline sessile, oblong-lanceolate, all sinuate-pinnatifid, sparsely pubescent and somewhat scabrous; flowers solitary or in small clusters at the ends of the branches; bracts ovate-lanceolate, sinuate-toothed, herbaceous, villous; sepals 5–6 mm. long, lanceolate; petals obovate, 8–14 mm. long, golden yellow; stamens about 40, outer filaments subulate; capsule somewhat clavate or obconic, 12–18 mm. long, seeds subprismatic and grooved on one angle, minutely tuberculate.

Dry slopes in light soil, Upper Sonoran Zone; Coast Ranges of central and southern California. Type locality: California. May–July. Buckaroo Penny.

15. *Mentzelia pectinata* Kell. San Joaquin Blazing Star. Fig. 3294.

Mentzelia pectinata Kell. Proc. Calif. Acad. 3: 40. 1863.

Acrolasia pectinata Rydb. Bull. Torrey Club 30: 278. 1903.

Mentzelia gracilenta var. *pectinata* Jepson, Man. Fl. Pl. Calif. 652. 1925.

Annual, the stems rather stout and usually with spreading branches. Leaves sessile, broadly lanceolate, pectinately lobed or pinnatifid, usually acuminate, sparingly scabrous-pubescent; bracts lanceolate, few-toothed, herbaceous; sepals narrowly lanceolate, 5–6 mm. long, spreading or reflexed in fruit; petals orange above, coppery red toward the base, obovate, 10–15 mm. long;

capsule clavate-cylindric, 20–25 mm. long, villous; seeds irregularly angled, rarely grooved on the angles, minutely tuberculate on the sides.

Dry slopes, usually in light sandy soil or on rocky ledges, Upper and Lower Sonoran Zones, Upper San Joaquin Valley and surrounding foothills to the Colorado Desert, California. Type locality: near Visalia, California. March–June.

16. *Mentzelia congesta* (Nutt.) Torr. & Gray. Ventana Stick-leaf. Fig. 3295.

Trachyphytum congestum Nutt. in Torr. & Gray, Fl. N. Amer. 1: 534. 1840.

Mentzelia congesta Torr. & Gray, Fl. N. Amer. 1: 534. 1840.

Acrolasia congesta Rydb. Bull. Torrey Club 30: 277. 1903.

Annual, the stems erect, 2–3 dm. high, simple or sparingly branched, pubescent. Leaves linear-lanceolate, entire or with a few sinuate teeth; bracts broadly lanceolate to obovate, usually toothed at the apex, scarious except at the tip; sepals lanceolate, 3 mm. long; petals yellow, 4–5 mm. long; capsule cylindric, villous; seeds irregularly angled, not grooved on the angles.

Dry hillsides and mountain slopes, Upper Sonoran and Arid Transition Zones; Idaho, Nevada, and California, mainly on the eastern slopes of the Sierra Nevada. Type locality: Lewis River, Idaho. May–July.

Mentzelia congesta var. *Davidsoniana* (Abrams) J. F. Macbride, Contr. Gray Herb. No. 56: 28. 1918. (*Acrolasia Davidsoniana* Abrams, Bull. Torrey Club 32: 538. 1905.) Differs chiefly in the smaller bracts, which are often lanceolate and acute at apex. This variety replaces the typical species in the mountains of southern California. Type locality: Mount Wilson, Los Angeles County.

17. *Mentzelia micrantha* (Hook. & Arn.) Torr. & Gray. Small-flowered Stick-leaf. Fig. 3296.

Bartonia micrantha Hook. & Arn. Bot. Beechey 343. 1840.

Mentzelia micrantha Torr. & Gray, Fl. N. Amer. 1: 535. 1840.

Acrolasia catalinensis Millsp. Field Mus. Bot. Ser. 5: 177. 1923.

Annual, the stems 3–6 dm. high, simple below, corymbosely branched and rather compact above. Leaves ovate, acute or acuminate, sinuate-toothed to entire, 2.5–5 cm. long; flowers in clusters at the ends of the branches; bracts foliaceous, broadly ovate, exceeding the flowers; sepals lanceolate 1.5–2 mm. long; petals oval, 3 mm. long; 5 outer filaments dilated; capsule narrowly cylindric, 6–12 mm. long, densely villous; seeds few, prismatic, with a shallow groove, the sides faintly muriculate.

Sandy and gravelly soils, Upper Sonoran Zone; Coast Ranges, from Trinity County, California, to northern Lower California and Guadalupe Island, Mexico. Type locality: California Coast Ranges. Collected by Douglas. May–July. San Luis Stick-leaf.

18. *Mentzelia tricuspis* A. Gray. Desert Stick-leaf. Fig. 3297.

Mentzelia tricuspis A. Gray, Amer. Nat. 9: 271. 1875.

Bicuspidaria tricuspis Rydb. Bull. Torrey Club 30: 275. 1903.

Mentzelia tricuspis var. *brevicornuta* J. M. Johnston, Univ. Calif. Pub. Bot. 7: 444. 1922.

Annual, branching from the base 5–15 cm. high, the branches short-hirsute. Leaves narrowly oblong-lanceolate or oblanceolate, 4–6 cm. long, acute at apex, narrowed at base to a short petiole, coarsely and saliently toothed to subentire; flowers terminating short branches; sepals 8–10 mm. long, long-attenuate, becoming involute and subulate in age; petals obovate, 15–20 mm. long, obtuse or rounded at the apex, and often apiculate, pale yellow; stamens in 4 or 5 series, the outer filaments dilated and toothed at apex, the anthers arising above the teeth on a filiform prolongation from the sinus; capsule 10–15 mm. long, 5–10 mm. in diameter, hirsute, reflexed in fruit; seeds irregularly angled, rugose, not winged.

Dry rocky hills, Lower Sonoran Zone; Mojave and Colorado Deserts, southern California to southern Nevada and Arizona. Type locality: "Desert districts south of St. George," Utah. April–May.

19. *Mentzelia involucrata* S. Wats. White-bracted Stick-leaf. Fig. 3298.

Mentzelia involucrata S. Wats. Proc. Amer. Acad. 20: 367. 1885.

Bicuspidaria involucrata Rydb. Bull. Torrey Club 30: 275. 1903.

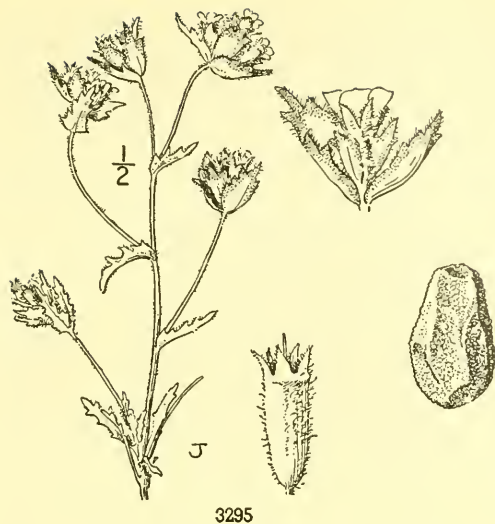
Nuttallia involucrata Davids. & Moxley, Fl. S. Calif. 240. 1923.

Annual, the stems stout, branching from the base, white, hispid, 15–30 cm. high. Leaves lanceolate, acute, the lower narrowed to a petiole, the upper sessile, irregularly sinuate-dentate, 3–8 cm. long, densely short-hispid; flowers terminating the branches; bracts ovate-lanceolate, 1.5–2.5 cm. long, pectinately toothed; white-scarious with green margins; sepals lanceolate-attenuate, 10–18 mm. long; petals 25–30 mm. long, yellow, oblanceolate to narrowly obovate, apiculate; outer filaments bicuspidate at apex with long linear cusps; capsules subcylindric, about 15 mm. long, 5–7 broad; seeds horizontally flattened to ovoid, irregularly angled, densely tuberculate.

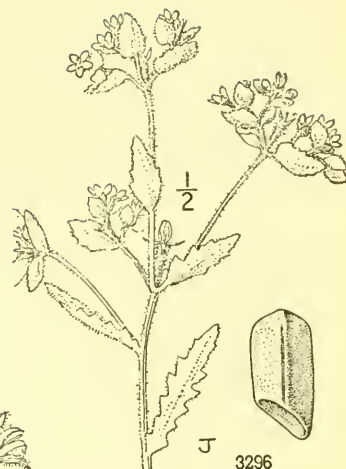
Dry desert hillsides and washes, Lower Sonoran Zone; Mojave Desert, California, to Lower California, western Arizona and Sonora. Type locality: San Bernardino County, California. March–May. Samija.

3. EUCNIDE Zucc. Linnaea 18: 508. 1844.

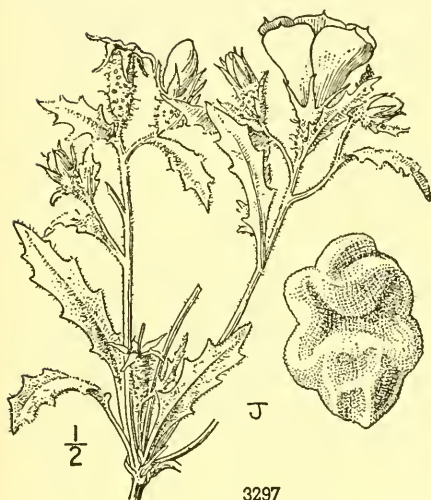
Herbs or low shrubs, clothed with short barbed pubescence and stinging hairs. Leaves alternate, petioled, toothed or lobed. Flowers mostly in terminal bracted cymes. Hypan-



3295



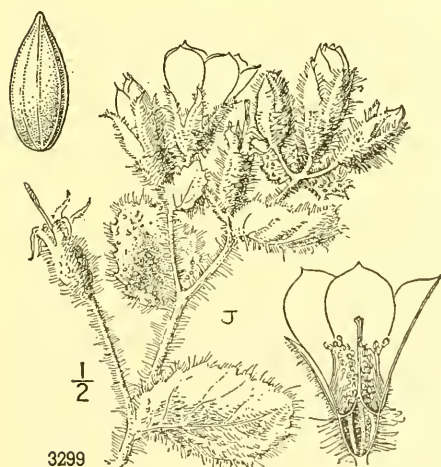
3296



3297



3298



3299



3300

3295. *Mentzelia congesta*
3296. *Mentzelia micrantha*

3297. *Mentzelia tricuspis*
3298. *Mentzelia involucreta*

3299. *Eucnide urens*
3300. *Datisca glomerata*

thium adnate to the ovary. Sepals 5, persistent. Petals 5, united at base, yellow or yellowish. Stamens numerous, inserted in a broad band on the base of the petals; filaments filiform. Style 5-cleft, the lobes often twisted; ovary 1-celled with 5 prominent placentae; ovules numerous. Capsule obovoid, opening by 5 valves at the apex. Seeds numerous, minute, longitudinally striate. [Name Greek, meaning well and nettle, in reference to the stinging hairs.]

A genus of about 8 species, natives of the arid regions of southwestern United States and northern Mexico. Type species, *Eucnide bartonioides* Zucc.

1. *Eucnide urens* Parry. Desert Rock-nettle. Fig. 3299.

Mentzelia urens Parry ex A. Gray, Proc. Amer. Acad. 10: 71. 1874.
Eucnide urens Parry, Amer. Nat. 9: 144. 1875.

Low shrub, 3–5 dm. high, the branches spreading or sometimes decumbent, the herbage clothed with fine villous hairs, stouter multi-barbed ones, and longer stout stinging ones. Leaves suborbicular to broadly ovate, 2.5–5 cm. long, coarsely and irregularly toothed, the lower petioled, the uppermost sessile and more or less clasping; flowers somewhat corymbose; pedicels stout; sepals oblong-lanceolate, 20–25 mm. long; petals pale yellow tinged with green, obovate, 3–4 cm. long, the mucronate tip hispid; stamens about half as long as the petals.

Sandy or rocky soils, Lower Sonoran Zone; desert ranges of Inyo and San Bernardino Counties, California, to southern Utah. Type locality: St. George, Utah. April–June.

Sympetaleia rupéstris (Baillon) A. Gray ex S. Wats. Proc. Amer. Acad. 24: 50. 1889. Annual resembling *Eucnide* in general habit, hispid with stout simple hairs interspersed with shorter barbed ones. Leaves petioled, rounded, shallowly lobed and toothed, often subcordate at base, 2–6 cm. broad; flowers solitary in the axils, on more or less recurved pedicels; sepals 5–7 mm. long; corolla sympetalous, the tube 8–10 mm. long, slender, lobes 2–3 mm. long. Desert washes, Lower Sonoran Zone; Painted Gorge near Coyote Wells, western edge of Colorado Desert, California, otherwise known only from Lower California and Sonora. Type locality: Guaymas, Sonora.

Family 101. DATISCACEAE.

DATISCA FAMILY.

Herbs or trees with alternate, simple, or pinnate leaves. Flowers dioecious or rarely perfect. Hypanthium in the staminate flowers short, in the pistillate flowers adnate to the ovary. Sepals 3–9, somewhat unequal. Petals none or 8. Stamens few to many, when present in the pistillate flowers usually reduced in number. Styles 3–8. Ovary 1-celled; placentae parietal, alternating with the sepals. Capsule dehiscent at the apex between the styles. Seeds numerous, striate and punctate, strophiolate, anatropous. Endosperm present; embryo straight.

A family of 3 genera and 5 species. The two other genera are trees of southern Asia with simple leaves, and belong to a distinct subfamily.

1. *DATISCA* L. Sp. Pl. 1037. 1753.

Perennial herbs, with unequally pinnatifid leaves and apetalous flowers in axillary racemes or glomerules. Staminate flowers with hypanthium very short, the sepals 4–9; stamens 10–25, with short filaments. Pistillate flowers with hypanthium adnate to the ovary, ovoid, obscurely 3-angled. Sepals 3; styles 3, filiform, 2-parted. Capsule oblong, coriaceous, 3–5-ribbed, dehiscent at the apex between the styles. [An old Greek name applied to some plant.]

A genus of 2 species natives of Asia and western North America. Type species, *Datisca cannabina* L.

1. *Datisca glomerata* (Presl) Baillon. Durango Root. Fig. 3300.

Tricerastes glomerata Presl, Rel. Haenk. 2: 88. pl. 64. 1835.
Datisca glomerata Baillon, Hist. Pl. 3: 407. 1871.

Glabrous perennial herb, 1–2 m. high, simple or sparingly branched. Leaves ovate to lanceolate in outline about 15 cm. long, unequally and laciniately pinnatifid, the floral reduced; flowers in the axils forming an elongated leafy raceme; anthers 4 mm. long, subsessile, yellow; styles elongated, exceeding the ovary; capsule oblong-ovoid, 6–8 mm. long, truncate, 3-angled; sepals 3, triangular-subulate, 1.5–2 mm. long.

Stream banks, Upper Sonoran and Transition Zones; North Coast Ranges and Sierra Nevada, California, to northern Lower California, east to western Nevada. Type locality: western Mexico and Monterey, California. The Mexican reference may be an error as it is not known otherwise south of northern Lower California. May–Aug.

Family 102. **CACTACEAE.***

CACTUS FAMILY.

Perennial succulent woody or herbaceous plants with globose, cylindrical, columnar, or flattened stems, these ribbed, smooth, tuberculate, bearing broad, fleshy leaves, or in ours, leafless or with small, caducous subulate leaves in *Opuntia*. Areoles complex, bearing wool, glochids (barbed spicules), spines, branches, or flowers, or various combinations of these structures. Flowers perfect or incompletely unisexual, sessile, solitary in an areole, but clustered when borne by contiguous areoles. Perianth-segments numerous, grading from sepals to petals, imbricated, the bases coalescent to form cup or tube borne at the apex of the ovary. Stamens numerous, inserted on the throat of the tube. Style 1; stigma-lobes 1 to numerous. Ovary inferior, 1-celled, many-ovulate. Fruit a dry or fleshy berry, many-seeded.

A family of about 120 genera and 1,200 species, native to North, Central, and South America, reaching their finest development in the drier regions of Mexico. Introduced and thoroughly established in Australia. Cultivated extensively as ornamentals in Europe and the United States.

Areoles containing glochids; leaves small, caducous; flowers rotate, definite perianth-tube lacking.

1. *Opuntia*.

Areoles without glochids; leaves on vegetative parts wanting; flowers with definite, though often short perianth-tubes.

Stems ribbed; fruits scaly or spiny, or both, often laniferous (except *Pediocactus*).

Flowers borne laterally, immediately above mature spine-bearing areoles; fruit more or less spiniferous; dehiscing irregularly.

Stems erect, 4–16 m. tall; flowers creamy white; fruit sparingly spinose. 2. *Carnegiea*.

Stems erect or decumbent, 1.5 m. tall or less; flowers not white.

Fruit quite spiny.

Stems 0.5–1.5 m. tall, branching near the base but not crowded-cespitose; flowers yellow.

3. *Bergerocactus*.

Stems 1–3 dm. long, cespitose; flowers red to purple.

4. *Echinocereus*.

Fruit naked.

9. *Pediocactus*.

Flowers borne subterminally above young areoles; fruit scaly (except *Pediocactus*), but not spiny, usually dehiscing by a basal or terminal pore (except *Pediocactus*).

Fruit ovoid to oblong, scaly.

Ribs continuous, not markedly undulate-tuberculate; principal spines annulate, some of them flattened.

Axils of scales on fruit copiously and persistently woolly; fruit dehiscing by a terminal pore; plants cespitose.

5. *Echinocactus*.

Axils of scales on fruit naked; fruit dehiscing by a basal pore; plants usually solitary.

6. *Ferocactus*.

Ribs distinctly undulate-tuberculate; principal spines terete, not markedly annulate.

Axils of scales on fruit naked; spines straight, not hooked; seeds muricate, hilum ventral.

7. *Echinomastus*.

Axils of scales on fruit woolly; some of central spines hooked; seeds tuberculate, hilum lateral.

8. *Sclerocactus*.

Fruit globose, smooth, scaleless or essentially so; dehiscing irregularly down the side.

9. *Pediocactus*.

Stems bearing spirally arranged tubercles; fruits smooth, scaleless, berries with no definite dehiscence.

Tubercles distinctly narrowly grooved on the upper side; fruit greenish when mature.

10. *Coryphantha*.

Tubercles not grooved; fruit red when mature.

Seeds rugose, with a large corky aril half as large as body of the seed.

11. *Phellosperma*.

Seeds favose-reticulate or pitted, no aril present.

12. *Mammillaria*.

1. **OPUNTIA** [Tourn.] Mill. Gard. Dict. abr. ed. 4. 1754.

Fleshy cacti with more or less woody skeletons and jointed cylindrical, clavate, or flattened stems and branches. Roots fibrous or fleshy-tuberous. Areoles axillary, bearing short, readily detached barbed bristles or glochids and usually 1 to several stout spines. Spines naked or ensheathed in dry, papery coverings. Leaves usually small and terete, early deciduous. Flowers borne in areoles of year-old growth; perianth-tube cup-shaped, short. Ovary areolate, 1-celled, many-ovulate. Sepals green, grading into colored petals. Stamens numerous, shorter than the petals, sensitive. Stigma-lobes short. Fruit fleshy

* Text contributed by Ira Loren Wiggins except for text of the genus *Opuntia* which is contributed jointly with Carl Brandt Wolf.

or dry, spiny or spineless. Seeds covered with a bony aril, light-colored, flattened. [Greek, named for town in Greece of the same name.]

A genus of over 250 species (over 1,000 names occur in the literature) from British Columbia and Massachusetts to the Straits of Magellan. Type species, *Cactus Opuntia* L.

Joints terete, globose to elongate-cylindric, not flattened, tuberculate; yearly accretions of wood in branches not separated by fleshy tissue.

Spines terete, acicular; sheaths deciduous.

Fruit dry, not fleshy when mature.

Tubercles on branches flattened, diamond-shaped, forming regular pattern; branches scarcely fleshy, spines usually solitary. 1. *O. ramosissima*.

Tubercles not flattened nor diamond-shaped, less regularly arranged; branches obviously fleshy; spines usually several.

Tubercles elongated, 2-3 times as long as wide; branching essentially terminal.

Fruit-spines in clusters of 8-12, stout; spines densely interlocked, obscuring the younger joints; plants light green. 2. *O. acanthocarpa*.

Fruit-spines solitary or few, acicular; spines not interlocked, not covering the joints; plants dark green. 3. *O. Parryi*.

Tubercles short, less than twice as long as wide; branching lateral as well as terminal.

Spines interlocking, obscuring the stems, the sheaths straw-colored; tubercles not flattened; stems not prostrate. 4. *O. echinocarpa*.

Spines not interlocking nor obscuring the stems, these and sheaths brownish; tubercles flattened; stems prostrate or scrambling. 5. *O. serpentina*.

Fruit fleshy when mature.

Fruit not proliferous; spine-sheaths pale yellow, roseate, or white, densely interlocking and obscuring body of the joints. 6. *O. Bigelovii*.

Fruit proliferous; spines and sheaths rusty yellow, scarcely interlocking, not obscuring the joints. 7. *O. prolifera*.

Spines 4-angled, subulate; sheaths caducous. 8. *O. Parishii*.

Joints flattened, pad-like, not tuberculate; yearly woody accretions, at least in pads, separated by thin layers of fleshy tissue.

Plants low, mostly basilate; areoles 1-3 mm. in diameter.

Areoles, or some of them, containing 1-5 spines; joints not pubescent. 9. *O. Treleasei*.

Areoles containing glochids only, spineless; joints distinctly puberulent.

Joints thin, 7-30 cm. long; flowers numerous, 6-10 cm. broad. 10. *O. basilaris*.

Joints thick, over one-fourth as thick as broad, broadly ellipsoid in cross-section, 2-6 cm. long; flowers few, 4-6 cm. broad. 11. *O. brachyclada*.

Plants 0.5-4 m. high, or if low, not basilate; areoles 2-5 mm. in diameter.

Fruits dry, not juicy when mature, spiny.

Joints turgid, nearly or quite as thick as broad, terminal ones easily detached; areoles containing white wool; stems often matted. 12. *O. fragilis*.

Joints flattened, not readily detached; areoles containing spines and glochids only, not woolly; stems not matted.

Spines subulate; areoles distant; only upper areoles of joints spiny. 13. *O. hystricina*.

Spines acicular; areoles approximate; all areoles of joints more or less spiny.

Spines stout, rigid, straight, 1-5 cm. long, some of them deflexed; joints orbicular. 14. *O. polyacantha*.

Spines slender, more or less flexuous, 3-12 cm. long, spreading; joints ovate to oblong.

Spines mostly acicular, 3-5 cm. long. 15. *O. erinacea*.

Spines bristle-like, flexuous, 6-25 cm. long. 16. *O. ursina*.

Fruits fleshy and juicy when mature, bearing glochids but not appreciably spiny.

Plants large shrubs or arborescent, 1.5-5 m. tall, with a well-defined trunk and ascending branches.

Joints 2-5 dm. long; trunk spineless; fruit 5-9 cm. long; spines brown or white.

Fruit yellow to reddish yellow; umbilicus flat; spines brownish. 17. *O. megacantha*.

Fruit deep red to purplish; umbilicus depressed; spines white. 18. *O. ficus-indica*.

Joints 0.75-2 dm. long; trunk densely clothed with deflexed spines; fruit 3-5 cm. long; spines yellow. 19. *O. chlorotica*.

Plants low shrubs or assurgent, much branched from the base, usually less than 1 m. high.

Spines clear yellow, or faintly reddish at the base, curved downward or deflexed in age; coastal. 20. *O. littoralis*.

Spines white, reddish or brown, spreading.

Flowers salmon to magenta; joints usually less than 20 cm. long, not very spiny; spines 1-3 per areole or lacking, not over 3 cm. long. 21. *O. Vaseyi*.

Flowers yellow; joints frequently much more than 20 cm. long, spiny; spines 1-6 cm. long.

Joints ovoid to oblong, 1.5-3 times as long as broad. 22. *O. Covillei*.

Joints broadly ovoid to orbicular, usually as broad as long, or nearly so.

Plants low bushes; branches few to many joints high; spines brownish only at the base.

Spines 3-8; joints comparatively thick; cismontane. 23. *O. occidentalis*.

Spines mostly 1-2 (1-4); joints comparatively thin; western margin of deserts. 24. *O. megacarpa*.

Plants prostrate, branches forming chains of joints, on edge, mostly 2 joints high; spines predominantly brownish throughout; eastern Mojave Desert. 25. *O. mojaviensis*.

1. *Opuntia ramosíssima* Engelm. Lead Pencil Cholla. Fig. 3301.

Opuntia ramosíssima Engelm. Amer. Journ. Sci. II. 14: 339. 1852.

Opuntia tessellata Engelm. Proc. Amer. Acad. 3: 309. 1856.

Cylindropuntia ramosíssima F. M. Knuth in Backeb. & Knuth, Kaktus-ABC 124. 1935.

Low bush 0.4–2 m. high, with gray-green, widely spreading branches 0.5–1 cm. in diameter. Joints 2.5–10 cm. long; tubercles low, crowded, 5–8 mm. long, nearly as wide, 4- or 6-angled, covering the surface with diamond-shaped plates; leaves ovoid, 1–3 mm. long, acute; areoles circular when young, compressed into a narrow slit in age, with white to tawny wool and pale yellow glochids; spines 1–4 at an areole 1 larger if more than 1, often wanting, acicular, porrect to spreading, 1–6 cm. long, reddish when young, nearly white in age, covered by a loose yellow papery sheath; flowers 3–4 cm. long, including the ovary; sepals subulate; petals obovate, 9–12 mm. long, aristulate, greenish yellow, tinged with red; stamen-filaments greenish yellow, anthers orange; style and stigma cream-colored; ovary narrowly obconic, covered with low emarginate tubercles, areoles filled with wool, glochids and 10–15 unsheathed spines; fruit dry, 1–2.5 cm. long, the spines making it appear bur-like; seeds few, lenticular, 3–5 mm. wide, stramineous.

Low hills and desert flats, Lower Sonoran Zone; from the vicinity of Victorville, San Bernardino County, and western Colorado Desert to southern Nevada, Arizona, and northwestern Sonora. April–May.

2. *Opuntia acanthocárpa* Engelm. & Bigelow. Buckthorn Cholla. Fig. 3302.

Opuntia acanthocarpa Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 308. 1856.

Cylindropuntia acanthocarpa F. M. Knuth in Backeb. & Knuth, Kaktus-ABC 124. 1935.

Erect, slender, terminally branched shrub 1–2 m. high. Terminal joints 4–25 cm. long, 2–3.5 cm. in diameter; tubercles prominent, 2–2.5 cm. long and laterally flattened; spines 8–18, unequal, 1.5–3.5 cm. long, yellowish to dark brown, each covered with a light yellow or whitish sheath; glochids numerous, yellow; flowers reddish to brownish yellow, 5 cm. long and wide when expanded; perianth-segments broadly obovate, obtuse; ovary short-turbinate, with a few prominent tubercles bearing 8–12 rigid acicular spines from middle to apex; fruit dry, 2.5–3.5 cm. long, naked below, tuberculate and spiny above the middle; seeds crowded, irregularly angled, 4–6 mm. long, light yellowish.

Desert mesas and slopes, Lower Sonoran Zone; eastern Mojave and Colorado Deserts, California, to southern Utah, central Arizona, Sonora and northern Lower California. April–May.

Opuntia acanthocarpa subsp. *Gánderi* C. B. Wolf, Occ. Papers Rancho Santa Ana Bot. Gard. 1: 75. 1938. Plants of vigorous growth; joints brighter green; spines 20–25, more slender, the lower ones deflexed; flowers smaller. San Felipe Valley, San Diego County, and southward along the east base of the Laguna Mountains and desert slopes of San Jacinto Mountains, California.

3. *Opuntia Pàrryi* Engelm. Valley Cholla. Fig. 3303.

Opuntia Parryi Engelm. Amer. Journ. Sci. II. 14: 339. 1852.

Opuntia bernardina Engelm. in Parish, Bull. Torrey Club 19: 92. 1892.

Cylindropuntia Parryi F. M. Knuth in Backeb. & Knuth, Kaktus-ABC 124. 1935.

An erect or ascending, openly, sparingly to profusely branched shrub 0.5–1.5 m. high. Joints slender, 7–30 cm. long, 1.5–2 cm. in diameter; tubercles 1.5–2.5 cm. long, narrow, with 1–5 (8) unequal, slender, brownish spines 0.5–3 cm. long at the apex of each, the longest spine usually porrect or deflexed; glochids brown, fading to yellow or ash-colored; flowers in clusters of 3–8 at the ends of older stems, 2–3 cm. long; sepals green to reddish; petals obovate, obtuse, yellow tinged with red; fertile fruit 2–3 cm. long, ovoid, deeply and broadly umbilicate, more or less tuberculate above the middle, the areoles bearing yellowish glochids, and the upper ones 1–7 acicular spines 5–12 mm. long; sterile fruit subglobose to obovoid, fleshy, less spiny; seeds few, whitish, 4–6 mm. broad, the margin shallowly grooved.

Dry gravelly fans and washes and in interior valleys, Lower and Upper Sonoran Zones; Cuyama Valley, Santa Barbara County, Los Angeles County in the vicinity of San Fernando, to the San Bernardino Valley, and eastern San Diego and western Imperial Counties, California. April–June.

4. *Opuntia echinocárpa* Engelm. & Bigelow. Summer Cholla or Staghorn Cholla. Fig. 3304.

Opuntia echinocarpa Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 305. 1856.

Opuntia echinocarpa var. *major* Engelm. loc. cit.

Opuntia echinocarpa var. *robustior* J. M. Coul. Contr. U.S. Nat. Herb. 3: 446. 1896.

Opuntia deserti Griff. Monatss. Kakteenk. 23: 132. 1913.

Cylindropuntia echinocarpa F. M. Knuth in Backeb. & Knuth, Kaktus-ABC 124. 1935.

Erect, ascending or spreading branched plant 0.5–1.5 m. high. Joints turgid, 8–25 cm. long, 1.5–2.5 cm. in diameter; tubercles prominent, broadly ovate, about 1 cm. long; areoles 2–6, bearing stout spines 2–3 cm. long and 6–12 shorter, more slender ones, fine yellowish wool and glochids; spines interlocking; flowers clustered at end of older branches, 2–3.5 cm. long, yellow tinged with red; ovary short-turbinate, tuberculate and densely clothed on the upper two-thirds with acicular spines 8–20 mm. long; fruit 1.5–2.5 cm. long, very spiny over upper two-thirds, 6–12 spines in each areole; seeds numerous, 5–6 mm. long, the margins grooved.

Desert areas and dry interior foothills, Lower and dry ridges in lower Upper Sonoran Zones, Mojave and Colorado Deserts and adjacent western foothills to Utah, Sonora, and northern Lower California. April–June.

Opuntia echinocarpa var. *Parkeri* (Engelm.) J. M. Coul. Contr. U.S. Nat. Herb. 3: 446. 1896. Plant

more robust, less intricately branched; joints 10–25 cm. long; flowers and fruits larger. Borrego Valley, foot of Mountain Springs Grade, Imperial County, California.

5. *Opuntia serpentina* Engelm. San Diego Cholla. Fig. 3305.

Cereus californicus Torr. & Gray, Fl. N. Amer. 1: 555. 1840. Not *Opuntia californica* Engelm. 1848.

Opuntia serpentina Engelm. Amer. Journ. Sci. II. 14: 338. 1852.

Opuntia californica Coville, Proc. Biol. Soc. Wash. 13: 119. 1899.

Cylindropuntia californica F. M. Knuth in Backeb. & Knuth, Kaktus-ABC 125. 1935.

Prostrate-scrambling or low, ascending shrub with slender, cylindrical bluish green stems. Joints 10–30 cm. long, 1.5–2.5 cm. in diameter, with somewhat flattened prominent tubercles 1–1.5 cm. long, slightly narrower than broad; areoles bearing 7–20 brownish acicular, rigid spines 8–20 mm. long, yellowish brown felt and light brown glochids; spines not interlocking nor hiding the blue-green stems; flowers clustered at tips of branches, 2.5–3 cm. long (including the ovary), about as broad when open, greenish yellow, the sepals and outer petals tinged with red; fruit broadly ovoid, umbilicate at the apex, prominently tuberculate, spiny except at very base; seeds crowded in the fruit, angulate.

Coastal foothills and mesas to 1,000 feet elevation, lower part of Upper Sonoran Zone; vicinity of San Diego southward into Lower California about to Ensenada. April–May.

6. *Opuntia Bigelovii* Engelm. Jumping or Ball Cholla. Fig. 3306.

Opuntia Bigelovii Engelm. Proc. Amer. Acad. 3: 307. 1856.

Cylindropuntia Bigelovii F. M. Knuth in Backeb. & Knuth, Kaktus-ABC 125. 1935.

Sturdy erect plant usually with a central spiny trunk 7–10 cm. in diameter, 1–2.5 m. high, and numerous short lateral branches, these soon deciduous below. Joints 5–20 cm. long, turgid, with crowded tubercles and dense, closely interlocked armament, the terminal ones very easily detached, primary ones persistent, turning sooty-black; tubercles more or less 4-sided, 8–10 mm. long, low; spines and sheaths shining pale yellow or roseate on young growth, 1.5–2.5 cm. long, 7–12 per areole, divergent; glochids and felt yellowish; flowers in clusters at the ends of joints, greenish yellow, 2.5–4 cm. long, the petals rather few in number; ovary bearing areoles filled with brown wool, glochids, and 1 to several small acicular spines 5–15 mm. long; fruit deeply umbilicate, dry, greenish, nearly or quite spineless; seeds flattened, angulate, greenish white, seldom fertile.

Forming extensive stands on dry hillsides, outwash slopes, mesas, and stabilized sand dunes, Lower Sonoran Zone; southern Nevada to the western Colorado Desert, northern Sonora and east of the mountains in northern Lower California. April.

Opuntia Fosbergii C. B. Wolf, Occ. Papers Rancho Santa Ana Bot. Gard. 1: 79. 1938. (*Opuntia Bigelovii* var. *Hoffmannii* Fosberg, Bull. S. Calif. Acad. 32: 121. 1933, *Opuntia Bigelovii* × *O. echinocarpa*.) Trunk vigorous, 2–3 m. high, often 2 to several branches from the base; shorter terminal joints more crowded than in *O. Bigelovii*; tubercles essentially as in *O. echinocarpa*, twice as long as broad; the green stem showing through armament; fruit as in *O. Bigelovii*. Mason Valley to Vallecitos, San Diego County, California.

Opuntia Münzii C. B. Wolf, Occ. Papers Rancho Santa Ana Bot. Gard. 1: 79. 1938. (*Opuntia Bigelovii* × *O. acanthocarpa*.) Plant to 4 m. tall, with general habit of × *O. Fosbergii*; tubercles narrower, 2–3 times as long as broad; spines more slender and less crowded. Chocolate Mountains, Colorado Desert, California.

7. *Opuntia prolifera* Engelm. Coast Cholla. Fig. 3307.

Opuntia prolifera Engelm. Amer. Journ. Sci. II. 14: 338. 1852.

Cylindropuntia prolifera F. M. Knuth in Backeb. & Knuth, Kaktus-ABC 126. 1935.

Bushy or with a well-defined trunk 1–2.5 m. high, the trunk and older branches woody. Joints 3–15 cm. long, 3–5 cm. in diameter, fleshy, turgid, easily detached, dark green; tubercles short and usually low and inconspicuous; areoles bearing yellowish brown felt, light yellow glochids 1–2.5 mm. long, and 5–12 rusty to nearly black spines 8–25 mm. long, these more or less divergently interlocked on young joints, sparser and fewer to lacking on older joints because of weathering; sheaths from sordid-yellow to rusty-brown; flowers 1 to several at the ends of branches, 2–3 cm. long (including the ovary); sepals green, tinged with rose; petals few, obovate, obtuse, 5–8 mm. long, rose to rose-purple; filaments greenish; ovary tuberculate, the areoles rather crowded, filled with light brownish glochids, the upper containing also 1–5 ascending acicular brown spines 5–18 mm. long; fruit globose, 2–3 cm. long, turgid, usually spineless, proliferous, usually seedless; seeds, when present, 5–6 mm. long, ovate, flattened.

Arid hills and mesas, near the coast, Upper Sonoran Zone; Santa Rosa, Santa Catalina, San Clemente, and Anacapa Islands, and vicinity of Ventura, California, southward into coastal Lower California to at least Rosario; occasionally inland to limits of ancient beach. April–July.

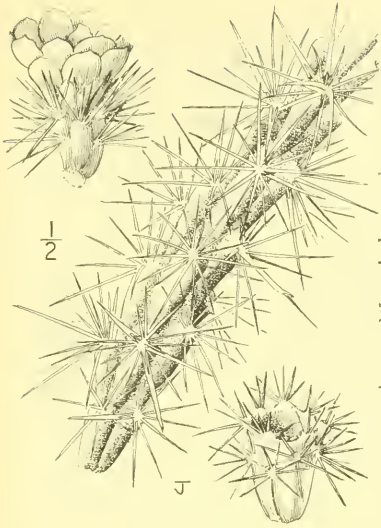
8. *Opuntia Parishii* Orcutt. Mat Cholla. Fig. 3308.

Opuntia Parryi Engelm. Pacif. R. Rep. 4: 48. pl. 22. figs. 4–7, pl. 24. fig. 7. 1856. Not *O. Parryi* Engelm. 1852.

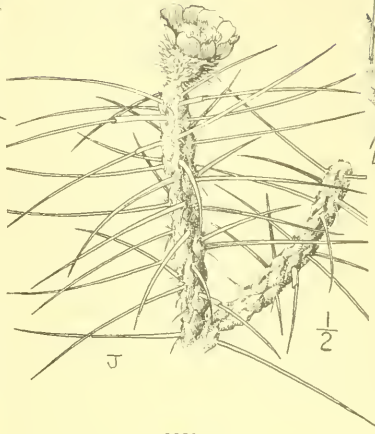
Opuntia Parishii Orcutt, West Amer. Sci. 10: 1. 1896.

Corynopuntia Parishii F. M. Knuth in Backeb. & Knuth, Kaktus-ABC 115. 1935.

A low, creeping, matted plant rooting along the under surface, forming mats up to 1.5 m. across, with erect, clavate branches 5–15 cm. high. Joints 2–3 cm. in diameter, nearly hidden by the dense, interlocking spines; tubercles 5–10 mm. long, narrow, 3–6 mm. high, prominent; areoles filled with white wool and yellowish glochids; spines sheathless, reddish, fading to ashy, the 3–4 centrals divergent, strongly flattened, subulate, 2–4 cm. long, the lowest broadest and longest; radials 6–12, acicular, terete, spreading; sheaths early caducous; glochids numerous,



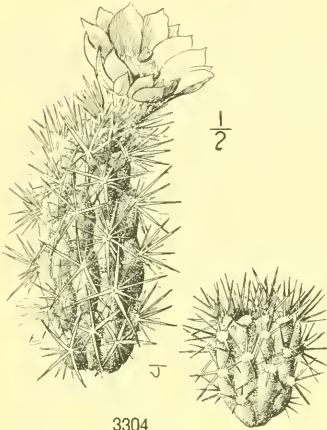
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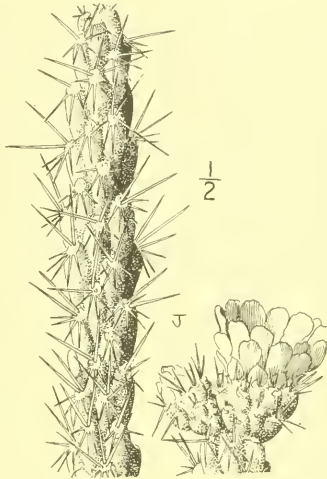
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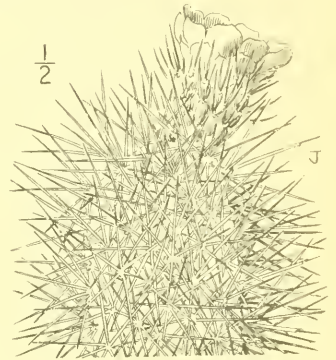
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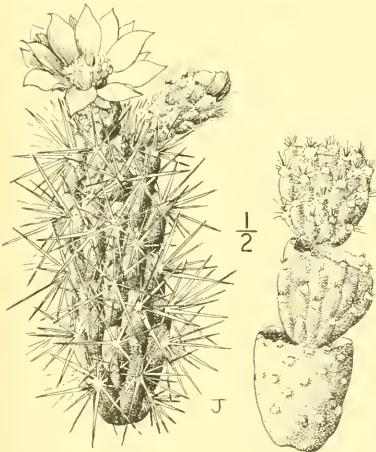
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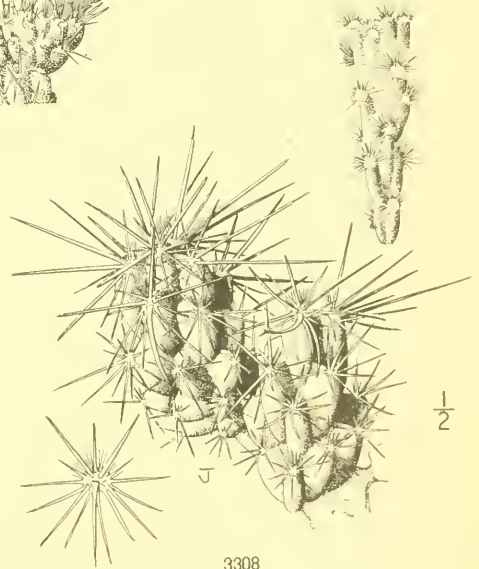
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3301. *Opuntia ramosissima*
3302. *Opuntia acanthocarpa*
3303. *Opuntia Parryi*

3304. *Opuntia echinocarpa*
3305. *Opuntia serpentina*
3306. *Opuntia Bigelovii*

3307. *Opuntia prolifera*
3308. *Opuntia Parishii*

2-8 mm. long, light yellowish brown; flowers yellow to reddish; fruit dry, 4-6 cm. long, narrowly ovate, narrowly tuberculate, the areoles 3-4 mm. in diameter, filled with white wool and radiating, acicular, yellowish brown glochids 3-9 mm. long that conceal the surface; seeds flattened-ovoid, smooth, turgid, 3.5-5 mm. long, yellowish white.

Inrequent in loose sandy or gravelly soil, upper part of Lower and lower part of Upper Sonoran Zones; southern Nevada to the eastern Mojave and western Colorado Deserts, and the Little San Bernardino Mountains, California. May.

9. *Opuntia Trelæsei* J. M. Coul. Trelease's Tuna. Fig. 3309.

Opuntia Trelæsei J. M. Coul. Contr. U.S. Nat. Herb. 3: 434. 1896.

Opuntia basilaris var. *Trelæsei* Toumey in Bailey, Cyclop. Hort. 1147. 1901.

Opuntia Trelæsei var. *Kernii* Griff. & Hare, N. Mex. Agr. Exp. Sta. Bull. 60: 81. 1906.

Low, spreading at the base, 2-3.5 dm. high, some of the branches of 2-4 erect joints. Joints broadly obovate, 8-15 cm. long, fleshy, 1-1.5 cm. thick, minutely papillose but glabrous, pale blue-green; areoles numerous, about 5-12 mm. apart, elliptic, 2-2.5 mm. wide, 3-4 mm. long, filled with sordid-yellow glochids 1-5 mm. long, a tuft of white wool at the base of young areoles, spineless, or more frequently with 1-3 divergent to subporrect acicular, sordid-yellow to brown spines 4-15 mm. long; flowers orchid- or rose-colored, 4-5 cm. broad; petals obovate, obtuse, 1.5-2 cm. long; fruit dry, broadly ovate to subglobose, bearing large areoles filled with dirty yellow glochids, dingy wool and the upper ones 3-10 rigid spines, 3-8 mm. long; seeds 6-7 mm. in diameter, rather turgid.

Dry grassy hills and valley floor, Lower Sonoran Zone; in the southern San Joaquin Valley south and east of Bakersfield, Kern County, California. April-May.

10. *Opuntia basilaris* Engelm. & Bigelow. Beaver-tail Cactus. Fig. 3310.

Opuntia basilaris Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 298. 1856.

Low, prostrate to erect plant, usually growing in clumps, branching mostly from the base, seldom over 2-5 dm. high. Joints orbicular to broadly obovate, 7-25 cm. long, short-puberulent, pruinose to glabrate in age, occasionally tinged with red or purplish; areoles numerous, circular to elliptic, 2-3 mm. in diameter, spineless, filled with dingy wool when young, this soon replaced by erect yellowish brown glochids 1-3 mm. long; flowers borne on upper margins of joints, somewhat clustered, 10-15 cm. broad, deep rose to rose-purple, a conspicuous velvety sheen on the petals; fruit dry at maturity, 5-6 cm. long, globose to obovoid, spineless, areoles and glochids as on the joints; seeds 6-10 mm. broad, more or less angled.

Arid mountain slopes and desert washes, Lower Sonoran and Arid Transition Zones; Mojave and Colorado Deserts and adjacent mountain slopes to southern Utah, Arizona, and northern Sonora. March-June.

Opuntia basilaris var. *ramosa* Parish, Bull. Torrey Club 19: 92. 1892. Joints oblong to narrowly obovate, 5-8 cm. wide up to 30 cm. long; stems frequently 3-6 joints high, branching freely above. Northwestern Los Angeles County eastward to the western edge of the Mojave Desert, south to western Riverside and north-eastern San Diego Counties; Caliente and Democrat Hot Springs, Kern County, California.

Opuntia whitneyana E. M. Baxter, Calif. Cactus 37. 1935. A low plant with quite thick, obovate red-tinged joints 4-15 cm. long, and small (2 mm. diameter) deeply sunken areoles; glochids short, scarcely reaching surface of joint; flowers with numerous, crinkly, erose, red petals. Rocky mountain sides and talus slopes on eastern side of the Sierra Nevada in Inyo and Mono Counties, California. Transition Zone.

Opuntia whitneyana var. *albiflora* E. M. Baxter, Calif. Cactus 39. 1935. Differing from the species in having more profusely branching green stems and white flowers. "Rounded mountain top 'flats' in the eastern Sierra Nevada Mountains near Mount Whitney."

11. *Opuntia brachyclada* Griff. Short-jointed Beaver-tail. Fig. 3311.

Opuntia brachyclada Griff. Proc. Biol. Soc. Wash. 27: 25. 1914.

Opuntia basilaris var. *brachyclada* Munz, Man. S. Calif. Bot. 325. 1935.

Low caespitose plant forming compact clumps, 1-4 joints high. Joints thick, obovate to nearly clavate-cylindrical, 3-6 cm. long, minutely and closely puberulent, deep green, often red-tinged; areoles 2-3 mm. in diameter, spineless, filled with gray wool when young, with yellow-brown glochids 1-3 mm. long in age; flowers few, 4-6 cm. broad, rose to rose-purple; fruit dry, obovoid, 2-3 cm. long, truncate at the apex, bearing areoles and glochids similar to those of the joints.

Upper Sonoran and Arid Transition Zones; on desert slopes of the San Gabriel and San Bernardino Mountains. April-June.

Opuntia brachyclada subsp. *humistrata* (Griff.) Wiggins & Wolf. (*Opuntia humistrata* Griff. Bull. Torrey Club 43: 83. 1916.) Joints 6-12 cm. long, obovate, thick but distinctly flattened, more freely branching, 4-6 joints high; flowers few, these and fruit as in the species. Interior cismontane valleys from the San Bernardino Valley to Temescal Canyon, Riverside County, California.

12. *Opuntia fragilis* (Nutt.) Haw. Pigmy Tuna. Fig. 3312.

Cactus fragilis Nutt. Gen. Pl. 1: 296. 1818.

Opuntia fragilis Haw. Suppl. Syn. Pl. Succ. 82. 1819.

Opuntia brachyarthra Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 302. 1856.

Opuntia fragilis var. *brachyarthra* J. M. Coul. Contr. U.S. Nat. Herb. 3: 440. 1896.

Opuntia fragilis var. *caespitosa* Hortus in Bailey, Cyclop. Hort. 2363. 1916.

Opuntia fragilis var. *tuberiformis* Hortus, loc. cit.

Opuntia columbiana Griff. Bull. Torrey Club 43: 523. 1916.

Tunas fragilis Nwd. & Lunell, Amer. Midl. Nat. 4: 479. 1916.

Low, spreading plant, sometimes forming matted clumps 1-2 dm. high, 3-4 dm. in diameter

of several hundred stems. Joints orbicular to obovate, 1-5 cm. long, often greatly thickened, subglobose, dark green, the terminal ones breaking off very easily; areoles 2-3 mm. in diameter, approximate, filled with white wool and a few light yellow glochids 1-4 mm. long; spines (2) 5-7, straight, brown throughout or ashy yellow below, brown at tips, 1-3.5 cm. long, spreading, or usually 1-3 subperrect; flowers yellow, 3-4 cm. long, 2.5-5 cm. broad when expanded, filaments reddish brown; areoles on ovary bearing wool, glochids, and the upper ones a few acicular spines 5-10 mm. long; fruit dry, 1.5-2 cm. long, sparsely spiny, with a slightly depressed umbilicus; seeds 5-6 mm. broad.

Dry flats and hillsides, Transition and Upper Sonoran Zones; southern British Columbia east to Wisconsin and Kansas, south to Siskiyou County, California, Arizona, and Texas. May-July.

13. *Opuntia hystricina* Engelm. & Bigelow. Rock Tuna. Fig. 3313.

Opuntia hystricina Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 299. 1856.

Opuntia rhodantha of authors, not Shum. 1896.

A low, prostrate plant with numerous few-jointed stems forming mound-like clumps 2-3 dm. high. Joints obovate to oblong or infrequently orbicular, 2.5-12 cm. long; areoles 10-15 mm. apart, the lower ones of the joint containing brownish glochids and short wool only, the upper ones spinose; spines 5-7, stout, subulate, brownish, 3-4 of them 1.5-3 cm. long, 2-3 accessory ones shorter, less spreading; flowers (including the ovaries) 5-6 cm. long, 6-8 cm. wide when expanded; petals pink or salmon color, obovate, 1.5-2.5 cm. long, apiculate; filaments yellow or reddish; fruit dry, armed with brownish, spreading spines 1-2 cm. long; seeds flattened, 4-5 mm. in diameter.

Rocky mountain sides and talus slopes, Canadian and Hudsonian Zones; vicinity of Piñon Flats, San Jacinto Mountains, Riverside County, and White Mountains, northeastern Inyo County, California, to western Nebraska. Aug.

14. *Opuntia polyacantha* Haw. Plains Tuna. Fig. 3314.

Cactus ferox Nutt. Gen. Pl. 1: 296. 1818. Not Willd. 1813.

Opuntia polyacantha Haw. Suppl. Syn. Pl. Succ. 82. 1819.

Opuntia missouriensis DC. Prod. 3: 472. 1828.

Opuntia Schaveriniana Schum. Monatss. Kakteenk. 9: 148. 1899.

Tunas polyacantha Nwd. & Lunell, Amer. Midl. Nat. 4: 479. 1916.

Low, spreading, freely branching plants forming small rounded clumps, 1-2 dm. high, 1.5-3 dm. in diameter. Joints orbicular to obovate or oblong, 3-10 cm. long, light green, glabrous; areoles circular to broadly elliptic, 2-3 mm. in diameter, 1 cm. or less apart, bearing dingy wool, yellowish to reddish brown glochids, and ashy gray to dark brown spines; spines 5-11, 7-20 mm. long, on some plants 1-3 of these slender, somewhat flexuous, up to 6 cm. long; marginal areoles usually bearing 1-3 flexuous white, gray, or reddish brown spines 3-8 cm. long; flowers 4-7 cm. long; sepals tinged with red, apiculate; petals yellow, 2.5-4 cm. long, obovate, obtuse to emarginate; fruit dry, oblong, 2-3 cm. long, bearing 1-7 light yellow or white spines 5-15 mm. long; seeds 6 mm. long, the margins acute.

Dry plains, hills and mountain valleys, in open or sparse pine woods, Arid Transition to Canadian Zones; British Columbia to Alberta, North Dakota, eastern Oregon, Arizona, Utah, and Texas. June-July.

15. *Opuntia erinacea* Engelm. & Bigelow. Old Man Prickly Pear. Fig. 3315.

Opuntia erinacea Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 301. 1856.

Low plants with prostrate stems and ascending or erect branches in dense clumps, 1-6 dm. high, 1-3 m. in diameter. Joints suborbicular to ovate, 6-15 cm. long, light yellowish green; areoles prominent, 7-12 mm. apart, 3-5 mm. in diameter, bearing ashy wool, numerous sordid-yellow to reddish brown glochids 3-6 mm. long, and slender acicular spines; spines 3-11, white, ashy or dark reddish brown, straight, 1.5-7 cm. long, spreading, 1-2 spines in each areole usually 1.5-3 times as long as the others; flowers, including the ovaries, 4-6 cm. long, nearly as broad, greenish yellow tinged with pink to light red, the yellow flowers fading pink; outer petals broadly obovate, apiculate, the inner 2-3 cm. long, obovate, the margins erosulate; fruit ovoid, 2.5-3 cm. long, closely covered with woolly areoles bearing stiff acicular spines 5-15 mm. long; seeds 5-6 mm. broad.

Gravelly washes and stony slopes, in desert mountains from 5,000 to 6,100 feet altitude, Upper Sonoran Zone; Mono County, San Bernardino Mountains and eastern Mojave Desert, California, to southern Utah and northern Arizona. April-June.

Opuntia erinacea var. *paucispina* Dunkle, Bull. S. Calif. Acad. 34: 3. 1935. Joints bluish green; areoles bearing 1-5 spines 0.5-4 cm. long. Vicinity of Ribbonwood, San Jacinto Mountains.

16. *Opuntia ursina* Weber. Grizzly Bear Cactus. Fig. 3316.

Opuntia ursina Weber in Bois, Dict. Hort. 2: 896. 1898.

Opuntia erinacea var. *ursina* Parish in Jepson, Fl. Calif. 2: 542. 1936.

A low, decumbent, branching plant 2-5 dm. high, forming dense mats 1-6 dm. wide. Joints obovate to oblong, 5-8 cm. wide, 8-15 cm. long, light green; areoles orbicular to ovoid, 3 mm. wide, 3-5 mm. long, 6-10 mm. apart, woolly when young, filled with yellowish to brownish glochids 1-5 mm. long; spines 8-15, ashy gray to white, 2-20 cm. long, bristle-like, reflexed, flexuous, usually copious and concealing the surface; flowers 6-7 cm. long and wide; petals

yellow, suffused with red, apiculate to short-acuminate; fruit 3–4 cm. long, obovoid-truncate, its areoles 3–6 mm. apart, filled with glochids and acicular spines 8–20 mm. long.

Gravelly slopes and rocky hillsides, Lower Sonoran Zone; Inyo County and Ord Mountains, northeastern San Bernardino County, California, to southern Nevada. April–May.

17. *Opuntia megacantha* Salm-Dyck. La Tuna or Rancheria Prickly Pear.

Fig. 3317.

Opuntia megacantha Salm-Dyck, Hort. Dyck 363. 1834.

Opuntia robusta var. *megacantha* Schelle, Handb. Kakteenkultur 57. 1907.

Opuntia castillae Griff. Rep. Mo. Bot. Gard. 19: 261. 1908.

Opuntia incarnadilla Griff. Rep. Mo. Bot. Gard. 22: 27. 1912.

Arborescent, 3–6 m. tall with a definite woody spineless trunk. Joints obovate to oblong, 3–6 dm. long, often asymmetrical and becoming concave-convex on lateral branches, pale green, somewhat glaucous; areoles 2.5–4 mm. in diameter, 5–8 cm. apart on large joints, bearing brown wool, a few light brown glochids, and 1–5 spines or spineless; spines 1–5, brown, slightly spreading to subdeflexed, 2–3 cm. long, confined to upper and marginal areoles in most plants; glochids usually deciduous, though sometimes reappearing on older joints; flowers 6–9 cm. broad, sepals greenish yellow, tinged with orange on the midribs; petals yellow, to deep orange; fruit obovate, 7–11 cm. long, clear yellow or tinged with orange-red, fleshy, edible; seeds yellowish white, 4–6 mm. broad.

Cultivated and occasionally escaped, Upper Sonoran Zone; in the coastal area from Santa Barbara, California, south into Lower California. April–July.

18. *Opuntia Ficus-indica* (L.) Mill. Indian Fig or Prickly Pear. Fig. 3318.

Cactus Ficus-indica L. Sp. Pl. 468. 1753.

Opuntia Ficus-indica Mill. Gard. Dict. ed. 8. no. 2. 1768.

Cactus Opuntia Guss. Prodr. Sic. 559. 1827–28. Not. L. 1753.

Opuntia vulgaris Tenore, Syll. Fl. Neap. 239. 1831. Not Mill. 1768.

Opuntia Ficus-barbarica Berger, Monatss. Kakteenk. 22: 181. 1912.

Large, spreadingly branched shrub or small tree up to 5 m. high, with a definite, spineless, woody trunk. Joints obovate to oblong or spatulate-oblong, 15–50 cm. long, slightly glaucous; areoles circular or broadly elliptic, containing a tuft of short brownish wool, numerous yellow-brown deciduous glochids, and 1–3 spines, or sometimes spineless; spines white, rigid, subulate, slightly flattened, unequal, 1.5–4 cm. long, subspreading; flowers 6–10 cm. broad, bright yellow, the sepals and outer petals sometimes faintly tinged with red; fruit obovate, 5–9 cm. long, often faintly pruinose, red-purple throughout the juicy flesh, the umbilicus deeply depressed; seeds 4–5 mm. broad.

Widely cultivated in tropical and subtropical countries, and occurring as an occasional escape about old gardens and ranches in coastal southern California. March–June.

19. *Opuntia chlorotica* Engelm. & Bigelow. Golden Prickly Pear. Fig. 3319.

Opuntia chlorotica Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 291. 1856.

Opuntia Tidballii Bigelow, Pacif. R. Rep. 4: 11. 1856.

Opuntia curvospina Griff. Bull. Torrey Club 43: 88. 1916.

Erect plant, with ascending branches, 1–2.5 m. high, usually with a definite woody trunk and persistent scaly gray or brownish bark densely armed with rigid deflexed spines. Joints orbicular to ovate, 12–20 cm. long, occasionally broader than long, light green, faintly glaucous; leaves subulate, 4–6 mm. long; areoles 1–3 cm. apart, conspicuous, extending 2–4 mm. above the surface, 5–8 mm. in diameter on young joints, becoming larger in age, containing a conspicuous tuft of sordid-yellow wool, numerous yellow glochids and 3–7 unequal spines; spines on the joints 1.5–4 cm. long, bright yellow, terete, mostly reflexed; those on main stem 15–40 in an areole, yellow, flattened, 2–5 cm. long, stellately radiating and covering whole surface; flowers yellow, 6–7 cm. broad; petals oblong, 2.5–3 cm. long, 12–15 mm. wide; fruit reddish purple, with greenish flesh, 4–5 cm. long, bearing rather crowded areoles containing wool, glochids and occasionally a few short spines; seeds small.

Occasional in canyons and rocky slopes, Lower and lower parts of Upper Sonoran Zones; northeastern San Bernardino County to western edge of the Colorado Desert, California, to southern Nevada, New Mexico, Sonora, and northern Lower California. April–June.

20. *Opuntia littoralis* (Engelm.) Britt. & Rose. Coastal Prickly Pear. Fig. 3320.

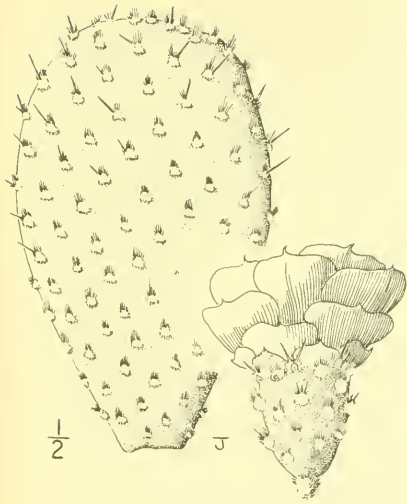
Opuntia Engelmannii var. *littoralis* Engelm. Bot. Calif. 1: 248. 1876.

Opuntia Lindheimeri var. *littoralis* J. M. Coult. Contr. U.S. Nat. Herb. 3: 422. 1896.

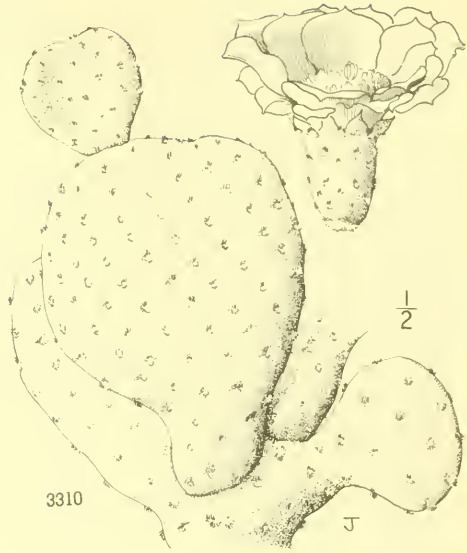
Opuntia littoralis Britt. & Rose, Smiths. Misc. Coll. 50: 529. 1908.

Opuntia occidentalis var. *littoralis* Parish in Jepson, Man. Fl. Pl. Calif. 657. 1925.

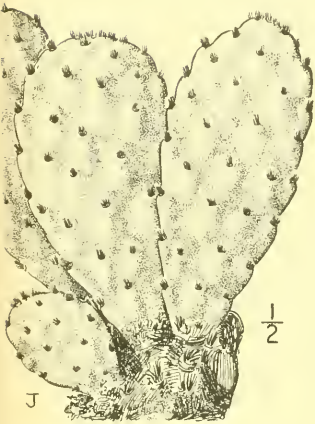
Ascendingly branched shrub 0.6–1.5 m. high, forming extensive dense colonies. Joints orbicular, ovoid, obovate, or broadly oblong, 10–20 cm. wide, 15–30 cm. long, 2–5 cm. thick; areoles prominent, 4–7 mm. in diameter, filled with dark brown wool, yellowish glochids 1–4 mm. long, and bearing 2–7 (9) unequal, slightly flattened, clear yellow spines 1–3 cm. long; spines of marginal areoles spreading, straight; those on face of joint mostly deflexed, curved, frequently slightly twisted; flowers 5–8 cm. broad, petals yellow, often suffused with red toward the base;



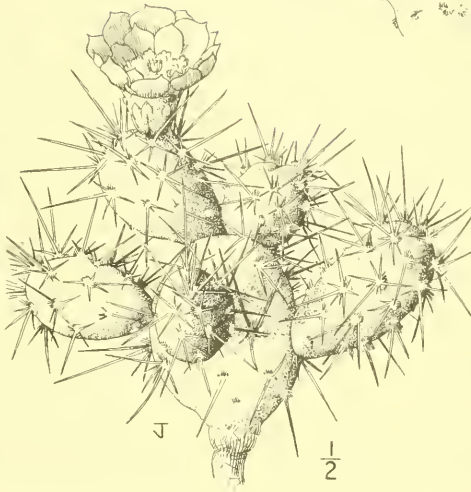
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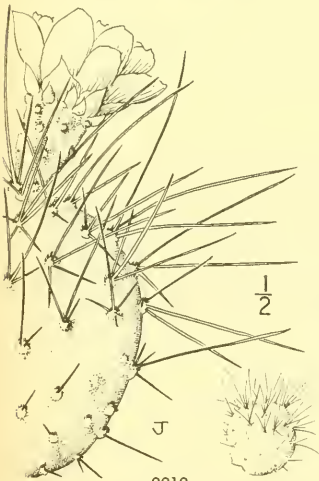
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3309. *Opuntia Treleasei*
3310. *Opuntia basilaris*
3311. *Opuntia brachyclada*

3312. *Opuntia fragilis*
3313. *Opuntia hystericina*
3314. *Opuntia polyacantha*

3315. *Opuntia erinacea*
3316. *Opuntia ursina*

fruit fleshy, subglobose to obovoid, 4–5.5 cm. long, shallowly umbilicate, bright reddish purple, bearing glochids in areoles 1–1.2 cm. apart; seeds 3–4 mm. broad, the margin ridged.

Along the coast, Upper Sonoran Zone; Santa Barbara County, California, to northern Lower California; occasionally a few miles inland. April–July.

21. *Opuntia Vaseyi* (J. M. Coult.) Britt. & Rose. Mesa Tuna or Vasey's Prickly Pear. Fig. 3321.

Opuntia mesacantha var. *Vaseyi* J. M. Coult. Contr. U.S. Nat. Herb. 3: 431. 1896.

Opuntia Rafinesquei var. *Vaseyi* Scherm. Gesamtb. Kakteenk. 717. 1898.

Opuntia humifusa var. *Vaseyi* Heller, Cat. N. Amer. Pl. ed. 2. 8. 1900.

Opuntia magenta Griff. Rep. Mo. Bot. Gard. 19: 268. 1908.

Opuntia Vaseyi Britt. & Rose, Smiths. Misc. Coll. 50: 532. 1908.

Opuntia rubiflora Davidson, Bull. S. Calif. Acad. 15: 33. 1916.

Opuntia intricata Griff. Proc. Biol. Soc. Wash. 29: 10. 1916.

Opuntia Vaseyi var. *magenta* Parish in Jepson, Man. Fl. Pl. Calif. 657. 1925.

Main stems prostrate or low-spreading, with some branches erect, 4–6 dm. high, forming dense mats several meters in diameter. Joints orbicular, ovate or obovate, 8–25 cm. long, light green, glaucous; areoles 3–5 mm. in diameter, bearing light brown wool, glochids, some spineless, others with 1–3 light brown or whitish, yellow-tipped spines 1–2 cm. long, these deflexed, acicular to subulate; flowers 4–5 cm. broad, salmon or salmon-yellow; fruit globose to short-oblong, 4–6 cm. long, spineless, bearing a few glochid-filled areoles, red-purple, the pulp red throughout, scarcely edible, umbilicus truncate or slightly depressed; seeds brown.

Gravelly washes and dry mesas, Upper Sonoran Zone; western and southern foothills of the San Gabriel and San Bernardino Mountains to western Riverside County and northern San Diego County, California. May–June.

22. *Opuntia Covillei* Britt. & Rose. Coville's Tuna. Fig. 3322.

Opuntia Covillei Britt. & Rose, Smiths. Misc. Coll. 50: 532. 1908.

Opuntia rugosa Griff. Proc. Biol. Soc. Wash. 27: 27. 1914.

Opuntia occidentalis var. *Covillei* Parish in Jepson, Man. Fl. Pl. Calif. 657. 1925.

Opuntia phaeacantha var. *Covillei* Fosberg, Bull. S. Calif. Acad. 33: 102. 1934.

Ascendingly branched shrub 0.5–2 m. high. Joints narrowly obovate, 7–15 cm. wide, 10–25 cm. long, light green to glaucous; areoles orbicular, 3–4 mm. in diameter, filled with brownish wool and yellow-brown glochids 1–3 mm. long; spines 1–9 (mostly 1–3 on sides of joint), 1–4 cm. long, terete to slightly flattened, frequently twisted, spreading, brown, or gray with a darker base, the tips often yellowish, dull; flowers clear yellow, 5–8 cm. broad; fruit fleshy, obovate, shallowly umbilicate, bright red to red-purple, 6–10 cm. long, bearing several glochid-filled areoles near the summit, nearly naked on the lower third; seeds 4–5 mm. long, ridged marginally.

Interior cismontane regions, Upper Sonoran Zone; southern California, from Los Angeles County to San Diego County. May–June.

Opuntia Covillei var. *Piercei* (Fosberg) Munz, Man. S. Calif. 327. 1935. (*O. phaeacantha* var. *Piercei* Fosberg, Bull. S. Calif. Acad. 33: 102. 1934.) Plant low, decumbent; spines 3.5–6 cm. long mostly on upper half of joint; glochids numerous, 4–10 mm. long. Dry hillsides, interior cismontane ranges Upper Sonoran Zone; Saugus, Los Angeles County to Warner's Hot Springs, San Diego County, California. At higher elevations than *O. Covillei*.

23. *Opuntia occidentalis* Engelm. & Bigelow. Western Prickly Pear or Thicket Tuna. Fig. 3323.

Opuntia occidentalis Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 291. 1856.

Opuntia Engelmannii var. *occidentalis* Engelm. Bot. Calif. 1: 248. 1876.

Opuntia Lindheimeri var. *occidentalis* J. M. Coult. Contr. U.S. Nat. Herb. 3: 421. 1896.

Opuntia demissa Griff. Rep. Mo. Bot. Gard. 22: 29. 1911.

Opuntia semispinosa Griff. Bull. Torrey Club 43: 89. 1916.

Ascendingly or spreadingly branched shrub 0.6–1 m. high, forming clumps 2 to several meters in diameter. Joints oblong-ovate to narrowly oblong, 1–2.5 dm. long, bright green or glaucous; areoles broadly elliptic, remote, 1.5–3.5 cm. apart, about 3 mm. broad, filled with dark brown wool, numerous golden-brown to dark brown glochids 1–3 mm. long, and bearing 1–7 stout, brown or brown but white-tipped, terete or slightly flattened spines 1–3.5 cm. long; the longest spine porrect or subporrect, the others downward-spreading; flowers 5–8 cm. long, nearly as broad when open, lemon-yellow with tinge of red toward base of outer perianth-segments; fruit obovoid to narrowly pyriform, 4–8 cm. long, red-purple, seeds orbicular, flattened, 8–10 mm. broad and prominently margined.

Subcoastal hillsides and washes, Upper Sonoran Zone; from Ventura County, California, to northern Lower California, occasionally reaching the coast from Los Angeles County southward. April–July.

24. *Opuntia megacarpa* Griff. Large-fruited Tuna. Fig. 3324.

Opuntia megacarpa Griff. Rep. Mo. Bot. Gard. 20: 91. 1909.

Opuntia Engelmannii var. *megacarpa* Fosberg, Bull. S. Calif. Acad. 33: 100. 1934.

Decumbent spreading shrub 5–8 dm. high, forming open clumps up to 2.5 m. wide. Joints broadly oval to suborbicular, 9–12 cm. wide, 15–17 cm. long, thin, rarely over 2 cm. thick, bluish

green; areoles broadly elliptic, 3-4 mm. long, bearing grayish wool and comparatively few yellow-brown glochids 1-4 mm. long; spines 1-2 (occasionally 4), terete or somewhat flattened, dull, light gray, or sometimes darker at the base, 1-4 cm. long, mainly on the upper two-thirds of the joint; flowers yellow, 5-6 cm. broad; fruit subglobose to obovoid, shallowly umbilicate, 5-7 cm. long, bright reddish purple; seeds 4-5 mm. long.

Western edge of Mojave and Colorado Deserts, upper Lower Sonoran and Arid Transition Zones; Los Angeles County to San Diego County, California. May-July.

25. *Opuntia mojaviensis* Engelm. & Bigelow. Mojave Tuna or Lost Tuna.
Fig. 3325.

Opuntia mojaviensis Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 293. 1856.

Opuntia phaeacantha var. *mojavensis* Fosberg, Bull. S. Calif. Acad. 33: 103. 1934.

Low prostrate plant forming small patches, or occurring as isolated individuals. Joints orbicular to obovate, 2-3 dm. long; light green and shiny, or tinged with red along the margins; areoles distant, 1.5-3 cm. apart, bearing sordid yellow glochids 3-10 mm. long and from 1-6 spines or spineless; spines somewhat flattened, reddish brown at the base with whitish or yellowish tips, unequal, the main one 4-6 cm. long, usually somewhat twisted, angled, deflexed or downward-spreading, the others slenderer, shorter; flowers 5-6 cm. wide, yellow; style, stamens and stigma pale yellow; fruit narrowly ovate, 2-3 cm. long, red throughout, spineless, or with 1-2 slender spines near the apex; seeds about 5 mm. wide, irregularly angled.

Washes and adjacent slopes, low Upper Sonoran Zone; Providence, New York, and Clark Mountains, eastern Mojave Desert, California. May-June.

2. *CARNÉGIEA* Britt. & Rose, Journ. N.Y. Bot. Gard. 9: 187. 1908.

A large columnar cactus with erect, stout, many-ribbed stems and branches, and crowded areoles bearing spines and tufts of brown felt. Flowers borne singly at the uppermost areoles, funnelform-campanulate, diurnal, the tube cylindrical; scales on the tube felted in the axils; inner perianth-segments white, waxy, short, spreading to reflexed. Ovary oblong. Stamens numerous, stigma-lobes narrowly linear, slightly exceeding the stamens. Fruit ovoid to ellipsoid, sparingly spinose, fleshy, containing a red edible pulp filled with small, black, shining seeds. Embryo sharply curved, cotyledons incumbent. [Named in honor of Andrew Carnegie.]

A monotypic genus of the southwestern United States and northern Sonora.

1. *Carnegiea gigantea* (Engelm.) Britt. & Rose. Sahuaro or Giant Cactus.
Fig. 3326.

Cercus giganteus Engelm. in Emory, Notes Mil. Rec. 159. 1848.

Pilocereus Engelmannii Lemaire, Ill. Hort. 9: Misc. 97. 1862.

Pilocereus giganteus Rümpler in Förster, Handb. Cact. ed. 2. 662. 1885.

Carnegiea gigantea Britt. & Rose, Journ. N.Y. Bot. Gard. 9: 188. 1908.

Stem simple and upright, or with 1 to several lateral branches, up to 16 m. high; branches 3-6.5 dm. in diameter. Ribs 12-25, obtuse, 1-3 cm. high, varying in width with the water supply; areoles 2-4 cm. apart on older growth, closely crowded at apex of stem, densely brown-felted; spines at the top of the flowering plant acicular, yellowish brown, porrect; those on sterile branches or older parts of the plant, broader, stouter, subulate, the central stouter than the radial spines, up to 7-8 cm. long, usually dark brown to black; flowers 10-12 cm. long, 5-8 cm. in diameter when fully expanded; tube 1-1.5 cm. long, green; throat 2.5-3.5 cm. long, expanded; filaments white; style 5-6.5 cm. long, cream-colored to white; ovary bearing scales with felted axils; fruit red to purple, 6-10 cm. long, splitting irregularly down the sides; seeds about 0.75 mm. in diameter.

On gravelly slopes, rocky ridges, and outwash fans, Lower Sonoran Zone; from northern Arizona and along the Colorado River in Riverside and Imperial Counties, California, to northern Sonora and Lower California. May.

3. *BERGEROCÁCTUS* Britt. & Rose, Contr. U.S. Nat. Herb. 12: 435. 1909.

Low colonial cactus with branching cylindrical, erect, ascending and procumbent stems. Ribs many, low; spines many and closely interlaced, bright yellow, acicular. Flowers small, with widely spreading pale yellow petals; scales on the short tube and ovary small, bearing wool and slender spines in their axils; perianth-segments obtuse. Fruit globular, dry, closely covered with straight slender spines. Seeds obovate, black, pitted; embryo curved. [Named in honor of the German botanist, Alwin Berger.]

A monotypic genus. Type species, *Cereus Emoryi* Engelm.

1. *Bergerocactus Emoryi* (Engelm.) Britt. & Rose. Cuñado or Golden-spined Cereus. Fig. 3327.

Cereus Emoryi Engelm. Amer. Journ. Sci. II. 14: 338. 1852.

Echinocereus Emoryi Rümpler in Förster, Handb. Cact. ed. 2. 804. 1885.

Bergerocactus Emoryi Britt. & Rose, Contr. U.S. Nat. Herb. 12: 435. 1909.

Branches 0.2-1.5 m. long, stout, erect, ascending or procumbent, spreading then rooting on



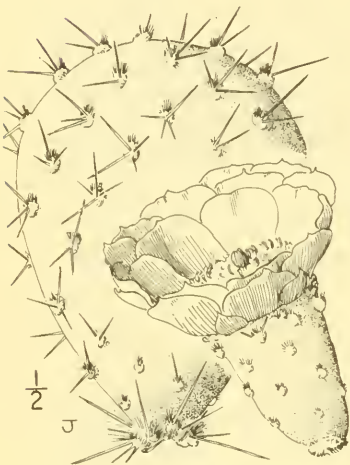
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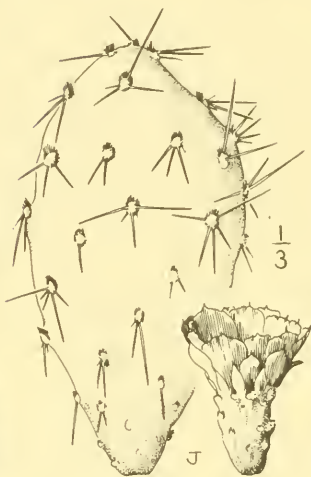
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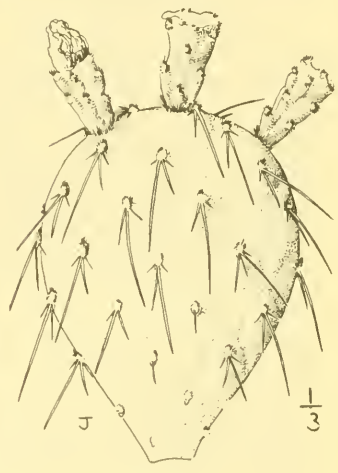
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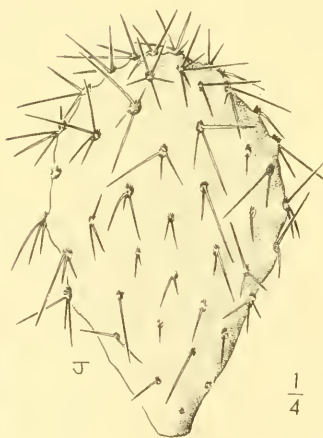
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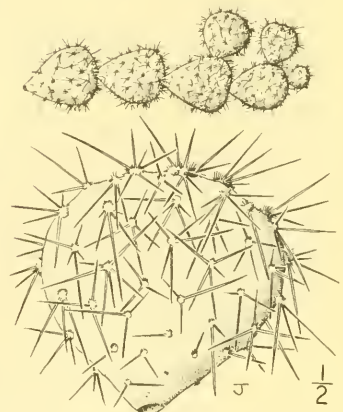
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3325

3317. *Opuntia megacantha*
 3318. *Opuntia Ficus-indica*
 3319. *Opuntia chlorotica*

3320. *Opuntia littoralis*
 3321. *Opuntia Vaseyi*
 3322. *Opuntia Covillei*

3323. *Opuntia occidentalis*
 3324. *Opuntia megacarpa*
 3325. *Opuntia mojavensis*

the lower side, 2-4 cm. in diameter, entirely clothed with a dense mat of bright yellow spines, turning gray to nearly black in age; ribs 18-25, 2-3 mm. high, somewhat tuberculate; spines 10-30 at an areole, slender-acicular, 1-6 of central spines sometimes 6 cm. long; flowers 2-2.5 cm. broad when expanded, the outer perianth-segments obtuse, obovate 5-8 mm. long, lemon-yellow, tinged with green, inner segments narrower, oblong, 8-10 mm. long, almost or quite devoid of the greenish tinge; fruit globular, 2-3.5 cm. in diameter, covered with spines 0.5-1.5 cm. long, dry; seeds oblong, black, shining, pitted, about 2.5-3 mm. long.

On coastal bluffs and hillsides never more than a few miles from the sea, Lower and lower Upper Sonoran Zones; from the vicinity of San Diego and Santa Catalina Island, California, southward a few miles beyond Rosario, Lower California. April-May.

4. *ECHINOCHEREUS* Engelm. in Wisliz. Mem. Tour. North. Mexico. 91. 1848.

Low erect, prostrate, or pendent, usually cespitose plants with globose to cylindric stems, which are considerably elongated if prostrate or pendent over rocks or cliffs. Spines of flowering and sterile areoles similar, acicular, subulate, terete or flattened, crowded or distant. Flowers usually (always in ours) large, diurnal, campanulate to short funnellform, the tube and ovary spiny. Stigma-lobes green. Fruit thin-skinned, spiny, though spines easily removed when mature. Seeds black, tuberculate. [Name Greek, referring to the spiny fruit.]

A genus of about 60 (65-70) species in the western United States and Mexico. Type species, *Echinocereus viridiflorus* Engelm.

Stems in loose clusters, 3-20; flowers rose-purple.

1. *E. Engelmannii*.

Stems crowded in compact mounds, 10-300; flowers pink or scarlet.

Flowers cerise-pink; stems 10-60.

2. *E. Munzii*.

Flowers scarlet; stems up to several hundred.

3. *E. mojavensis*.

1. *Echinocereus Engelmannii* (Parry) Rümpler. Saints' Cactus. Fig. 3328.

Cereus Engelmannii Parry ex Engelm. Amer. Jour. Sci. II. 14: 338. 1852.

Cercus Engelmannii var. *variegatus* Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 283. 1856.

Echinocereus Engelmannii Rümpler in Förster, Handb. Cact. ed. 2. 805. 1885.

Echinocereus Engelmannii var. *variegatus* Rümpler in Förster, Handb. Cact. ed. 2. 806. 1885.

Loosely branched cespitose plant with 3-20 ascending cylindric branches 1-3.5 dm. high, 5-8 cm. in diameter. Ribs 11-14, obtuse, 5-10 mm. high; areoles nearly circular; radial spines 8-15, 1-1.5 cm. long, appressed-spreading, rigid, straight or slightly curved; central spines 3-6, stout, more or less twisted and curved, white to brown, terete to slightly flattened, 3-4 (7) cm. long; flowers 5-8 cm. long, as broad or broader when expanded, reddish purple; perianth-segments oblong, acuminate, 3-4 cm. long; fruit ovoid to oblong, 2.5-3 cm. long, covered with clusters of acicular spines and woolly felt borne in the axils of acuminate scales 3-5 mm. long; seeds black, globose, 1-1.5 mm. in diameter, tuberculate.

Gravelly or stony hillsides and washes, Lower Sonoran Zone; Inyo County through Mojave and Colorado Deserts, California, to southern Utah, Arizona, Lower California, and Sonora. April-May.

2. *Echinocereus Múnzii* (Parish) L. Benson. Munz's Nigger-head. Fig. 3329.

Cereus Munzii Parish, Bull. S. Calif. Acad. 25: 48. 1926.

Echinocereus Engelmannii var. *Munzii* Pierce & Fosh. Bull. S. Calif. Acad. 32: 123. 1933.

Echinocereus Munzii L. Benson, Amer. Journ. Bot. 28: 361. 1941.

A cespitose plant with 10-60 oblong stems 10-20 cm. long, compactly crowded in cushion-like clumps. Ribs 10-20, undulate, low; spines all white to ashy gray, radials 8-16, acicular to narrowly subulate, spreading and interlocking, unequal, 2-3 cm. long; central spines 1-4, stouter than the radials, 2.5-5 cm. long; flowers campanulate, 4-7 cm. long, 3-4 cm. broad when expanded, cerise-pink; perianth-segments obtuse; floral tube and ovary clothed with clusters of unequal, white acicular spines 5-12 mm. long, embedded in short, felt-like white wool; fruit obovoid 2-2.5 cm. long, red, clothed with clusters of acicular readily deciduous spines; seeds rugulose.

Dry stony slopes along the lower margins of the Arid Transition Zone; desert side of the San Bernardino and San Jacinto Mountains, California, southward into northern Lower California. May.

3. *Echinocereus mojavensis* (Engelm. & Bigelow) Rümpler. Mojave Nigger-heads. Fig. 3330.

Cereus mojavensis Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 281. 1856.

Cereus Bigelovii Engelm. Pacif. R. Rep. 4: pl. 4. fig. 8. 1856.

Echinocereus mojavensis Rümpler in Förster, Handb. Cact. ed. 2. 803. 1885.

A cespitose plant with sometimes several hundred (to 800) closely crowded globose to oblong pale green spiny stems 5-20 cm. long, 4-7 cm. in diameter, forming rounded mounds. Ribs (8) 10-13, 5-6 mm. high, undulate, obtuse and becoming indistinct toward the base of the stem; spines white to gray, the radial spines 3-10, acicular, 1-2.5 cm. long, spreading and interlocking, straight or slightly curved; central spines 1-3, subulate, 2.5-5 cm. long, porrect to spreading more or less flexuous; flowers 5-7 cm. long, scarlet, narrower than long when expanded;

perianth-segments broadly obovate, obtuse to retuse; stigma-lobes green; ovary and fruit clothed with groups of short acicular spines embedded in white felt; fruit oblong, 2–3 cm. long.

Rocky hillsides, cliffs, mountain valley floors, and mesas in the desert ranges, Lower Sonoran to lower Arid Transition Zones; Inyo County south to San Bernardino County, California, east to Nevada, Arizona, and San Felipe Desert, Lower California. May.

5. *ECHINOCÁCTUS* Link & Otto, Verh. Ver. Beförd. Gartenb. 3: 420. 1827.

Single or caespitose plants with globose or cylindrical stems clothed with dense mat of wool or naked at the apex. Ribs few to many. Areoles large, very spiny. Flowers borne on the crown of the plant, yellow or pink, medium in size; flower-tube covered with imbricate, persistent, pungent scales. Ovary clothed with narrower scales having axillary mats of wool. Fruit densely white-woolly, dry, thin-walled, oblong. Seeds black, smooth, shining or papillose; hilum subbasal. [Name Greek, meaning hedgehog cactus, referring to the rigid spines.]

A genus of about 12 species (narrower sense) of Mexico and the southwestern United States. Type species, *Echinocactus platyacanthus* Link & Otto.

1. *Echinocactus polycéphalus* Engelm. & Bigelow. Nigger-heads. Fig. 3331.

Echinocactus polycephalus Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 276. 1856.

Echinocactus polycephalus var. *flavispinus* Haage Jr. Monatss. Kakteenk. 9: 43. 1899.

Solitary when very young, but soon forming clumps of 3–60 heads, each globular to oblong-ovoid, 1–3 (7) dm. high. Ribs 10–21, 2–3 cm. high, tuberculately irregular; areoles 10–12 mm. in diameter; radial spines 8–10, unequal, 2.5–5 cm. long, woolly and reddish when young, glabrate and gray to black in age, subulate, flattened; central spines 3–5, stouter than the radial ones, more or less annulate, curved but not hooked, 3–10 cm. long; flowers 5–6 cm. long, yellow; perianth-segments linear-oblong, entire; scales on flower-tube and ovary small, obscured by wool; fruit 1.5–2.5 cm. long, dehiscent by a basal pore; seeds angulate, dull black, 3–4 mm. long.

Rocky hillsides and gravelly slopes, Lower Sonoran Zone; deserts of San Bernardino County, California, to southern Utah, Arizona, northern Sonora, and Lower California. Feb.–March.

6. *FEROCÁCTUS* Britt. & Rose, Cactaceae 3: 123. 1922.

Globular or cylindrical, often massive cacti. Ribs thick and prominent, often slightly twisted spirally about the stem. Spines heavy, straight or hooked, the central ones usually flattened and annulate. Areoles large, having flowers just above the spine clusters and more or less woolly-felted when young. Flowers conspicuous, broadly funnelliform to campanulate, the tubes very short. Stamens numerous, short, borne in the throat of the corolla, about one-third to one-half the length of the perianth-segments. Ovary and flower-tube scaly, the scales naked in their axils. Fruit oblong, thick-walled and leathery, usually dry at maturity and dehiscent by a large basal pore. Seeds black, pitted; embryo curved. [From the Latin word, *ferus*, fierce, and *cactus*, referring to the heavy armament.]

A genus of about 35 species, all from the southwestern United States and northern Mexico. Type species, *Echinocactus Wislizenii* Engelm.

Plants low, rarely over 2 dm. high; radial spines heavy; flowers greenish.

1. *F. viridescens*.

Plants 0.5–3 m. high; some of the radial spines bristly or acicular; flowers yellow.

2. *F. acanthodes*.

1. *Ferocactus viridescens* (Torr. & Gray) Britt. & Rose. San Diego Barrel Cactus. Fig. 3332.

Echinocactus viridescens Torr. & Gray, Fl. N. Amer. 1: 554. 1840.

Melocactus viridescens Nutt. in Tschernacher, Bost. Journ. Nat. Hist. 5: 293. 1845.

Echinocactus limitus Engelm. in J. M. Coulter. Contr. U.S. Nat. Herb. 3: 374. 1896.

Ferocactus viridescens Britt. & Rose, Cactaceae 3: 140, pl. 14. 1922.

Simple, rarely 1–2 branched at the base, globose or subglobose-depressed when young, becoming short-cylindric in age, 2.5–3.5 dm. in diameter, 3–4 dm. high, usually broader than high; ribs 10–20, rounded or obtusely angled, 1–2 cm. high, undulate. Areoles narrow, elliptic, 1–2 cm. long, spinescent in the lower part, floriferous and felted in the upper part; spines bright red to brown or yellowish, central spines 4, stout, flattened and somewhat annulate, cruciately spreading, the three upper about 2 cm. long, the lowest one stouter, 2.5–3.5 cm. long; radial spines 10–20, spreading, 1–2 cm. long, acicular, but heavy; flowers greenish yellow, 3.5–4 cm. long; perianth-segments oblong, serrulate on the margins, with reddish midveins; scales on the ovary subcordate, imbricate when young, distinct in age; fruit 1.5–2 cm. long, yellowish green, or sometimes tinged with red; seeds about 1.5 mm. long, minutely pitted.

Dry grassy hillsides near the sea coast, Upper Sonoran Zone; from vicinity of San Diego Bay, California, southward about fifty miles near the sea in northern Lower California. March–May.

2. *Ferocactus acanthodes* (Lemaire) Britt. & Rose. Miner's Compass.

Fig. 3333.

Echinocactus acanthodes Lemaire, Cact. Gen. Nov. Sp. 106. 1839.*Echinocactus viridescens* var. *cylindraceus* Engelm. Amer. Journ. Sci. II. 14: 338. 1852.*Echinocactus cylindraceus* Engelm. Proc. Amer. Acad. 3: 275. 1856.*Echinocactus californicus* Schum. Gesamtb. Kakteenk. 357. 1898.*Echinocactus Copoldii* Schum. loc. cit.*Ferocactus acanthodes* Britt. & Rose, Cactaceae 3: 129. 1922.*Ferocactus Rostii* Britt. & Rose, op. cit. 146.

Simple or cespitose, globular when young but becoming cylindrical and 2–2.5 m. high, very spiny, the body almost completely hidden by the tangle of spines; ribs 20–30, acute, 1–2.5 cm. high. Areoles 1–1.5 cm. in diameter, densely brown-felted when young, crowded; spines bright red to clear yellow; central spines 1–4, subulate, slender, somewhat flattened or only angled, annulate, often tortuous and more or less curved, not hooked at the tips, 5–12 cm. long; radial spines of 5–7 stout and 3–7 slender bristle-like spines, or the latter type lacking; flowers campanulate, yellow, often tinged with orange or red, 4–6 cm. long, the limb about as broad when expanded; scales of tube and ovary imbricate when young, ovate, blotched with purple on the back; perianth-segments oblong to spatulate, often erosulate; filaments yellow; style greenish yellow; fruit 3–3.5 cm. long, oblong; seeds 3–3.5 mm. long, pitted.

Dry rocky desert slopes and hillsides, Lower Sonoran Zone; Inyo County, California, to Nevada, Arizona, northwestern Sonora, and to southern Sierra San Pedro Martir, Lower California. April–June.

7. *ECHINOMÁSTUS* Britt. & Rose, Cactaceae 3: 147. 1922.

Plants small, globose to short-cylindric, with low, somewhat spiraled ribs divided into low but usually distinct tubercles. Areoles bearing several spreading, often intricately intertangled acicular spines, central spines 1 to several or absent, straight or slightly curved but not hooked, when present usually stoutish. Flowers borne at base of short, woolly groove nearly buried by spine-cluster in young areoles near apex of plant, purple or pinkish purple. Fruit oblong, scaly, at length dry, dehiscing by a basal pore, the scales and their axils naked. Seeds black, muricate, the hilum ventral, depressed. [Name Greek, meaning breast of a hedgehog, referring to the spiny tubercles.]

A genus of less than a dozen species from the southwestern United States and northern Mexico. Type species, *Echinocactus erectocentrus* J. M. Coul. & Rose.

1. *Echinomastus Johnsonii* (Parry) E. M. Baxter. Eight-spined Hedgehog.

Fig. 3334.

Echinocactus Johnsonii Parry in Engelm. Bot. King Expl. 117. 1871.*Echinocactus Johnsonii* var. *octocentrus* J. M. Coul. Contr. U.S. Nat. Herb. 3: 374. 1896.*Ferocactus Johnsonii* Britt. & Rose, Cactaceae 3: 141. 1922.*Echinomastus Johnsonii* E. M. Baxter, Calif. Cactus 75. 1935.

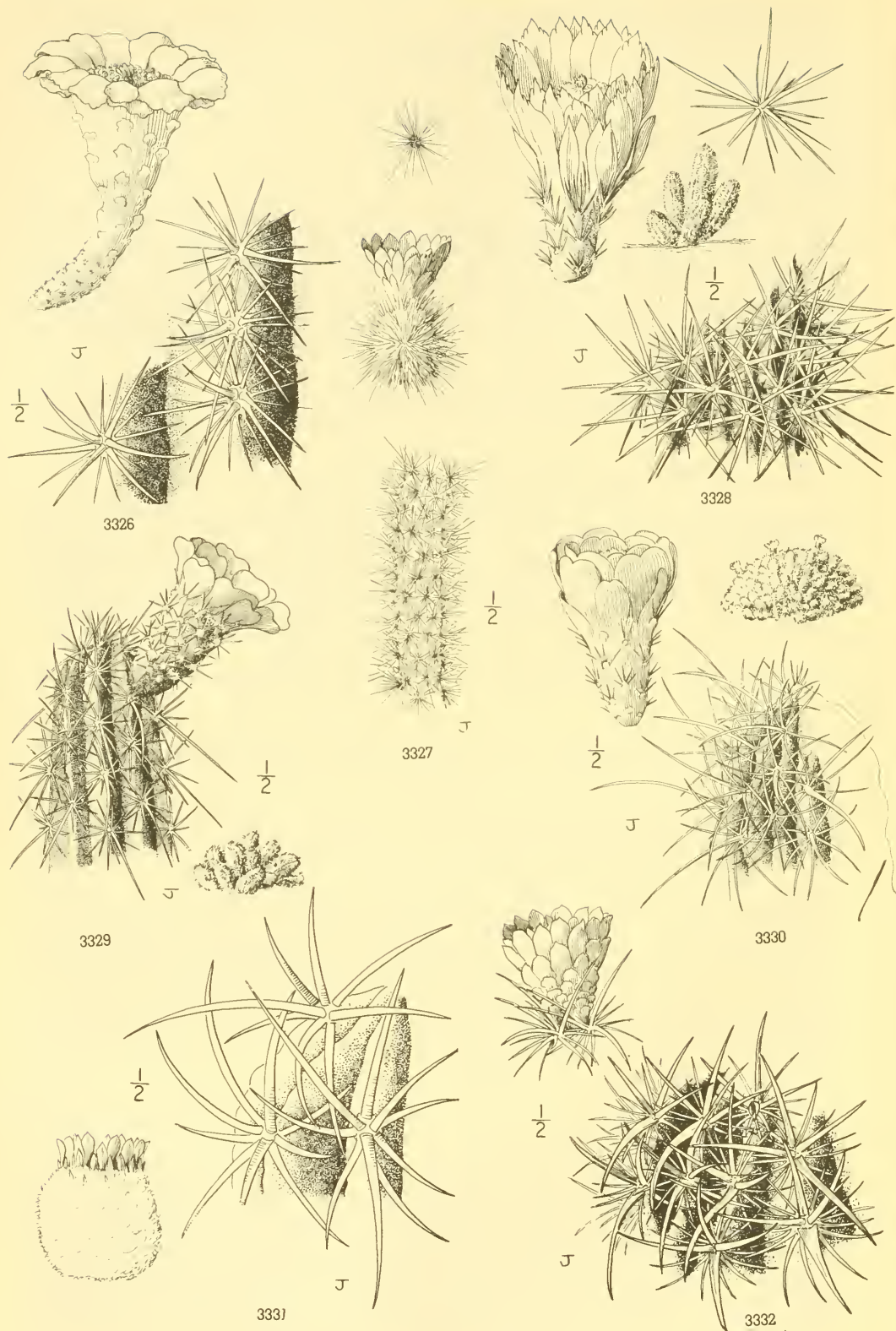
Simple oval plant 8–15 cm. tall, 6–10 cm. in diameter; ribs 17–21, narrow, 3–6 mm. high, undulate-tuberculate, almost completely hidden by the interlocking spines. Areoles 1.5–2 cm. apart vertically, with a short, narrow woolly groove running from the upper margin of the areole to the axil of the tubercle; apex of plant devoid of spines but a heavily felted-over circular patch 1–1.5 cm. in diameter at the apex; radial spines 9–14, grayish to yellowish, tinged with red toward the apex, often becoming darker in age, 1–2 cm. long, radiate-spreading; central spines 4–8, stouter, darker red, 2–3.5 cm. long, straight, distinctly bulbous at the base, divaricately spreading; flowers 4–6 cm. long, nearly as wide, the petals pink to deep rose or red and with a silvery sheen; scales of the ovary obtuse, membranous on the margins; fruit oblong, 10–15 mm. long, nearly naked; seeds finely reticulate-pitted.

Rocky hillsides in lime-impregnated soil, Lower Sonoran Zone; Inyo County, California, and adjacent Arizona and Nevada. March–April.

8. *SCLEROCÁCTUS* Britt. & Rose, Cactaceae 3: 212. 1922.

Simple, or rarely cespitose cactus with undulate, tuberculate prominent ribs, intertangled spines of three kinds. Areoles bearing short, terete, white acicular radial spines, maroon to bright red, longer, terete, strongly hooked central spines and angulate, flattened, somewhat tortuous, white, unhooked spines in upper part of the areole. Flowers borne above and adjacent to areoles near apex of plant, subcampanulate. Ovary oblong, with tufts of short wool in the axils of the scattered scales. Fruit pyriform, dehiscing by a basal pore, nearly naked. Seeds tuberculate, large; embryo curved, endosperm abundant. [Name Greek, referring to the formidable hooked spines.]

A genus of 2 species from the deserts of the southwestern United States. Type species, *Echinocactus polyancistrus* Engelm. & Bigelow.



3326. *Carnegiea gigantea*
 3327. *Bergerocactus Emoryi*
 3328. *Echinocereus Engelmianii*

3329. *Echinocereus Munzii*
 3330. *Echinocereus mojaviensis*

3331. *Echinocactus polycephalus*
 3332. *Ferocactus viridescens*

1. *Sclerocactus polyancistrus* (Engelm. & Bigelow) Britt. & Rose. Mojave Bisnaga. Fig. 3335.

Echinocactus polyancistrus Engelm. & Bigelow in Engelm. Proc. Amer. Acad. 3: 272. 1856.
Sclerocactus polyancistrus Britt. & Rose, Cactaceae 3: 213. 1922.

Simple globose to oblong plant up to 4 dm. high. Ribs 12-17, obtuse, 1-1.5 cm. high, strongly undulate; radial spines 15-20, terete, 1-2.5 cm. long; hooked central spines 6-8, 3-6 cm. long, spreading, borne on the lower two-thirds of the areole, the upper third bearing 2-4 (usually 3) flattened, erect, white spines 4-12 cm. long; flowers magenta, 4-6 cm. long; inner perianth-segments oblong, 3-4 cm. long; tube 2-3 mm. long; stamens numerous, half as long as the perianth; style 1-1.5 cm. longer than the stamens; stigma-lobes greenish; fruit becoming dry, nearly scaleless, 3-4 cm. long; seeds black, 4 mm. long, hilum sublateral.

Occasional on gravelly slopes and mesas, Lower Sonoran Zone; Mojave Desert, California, into southern Nevada and Utah, and northwestern Arizona. May.

9. *PEDIOCÁCTUS* Britt. & Rose in Britt. & Brown, Ill. Fl. ed. 2. 2: 569. 1913.

Small globose, single or cespitose leafless cactus with large tubercles borne on 8-13 low spiraled ribs. Areoles woolly when young, becoming naked. Flowers broadly campanulate, with a very short tube, pink, borne just to one side of the areole at the apex of a tubercle, the outer perianth-segments shorter than the inner; inner perianth-segments oblong, acute to mucronate; axils of scales on the tube naked. Stamens numerous. Ovary globose, green. Fruit dry, greenish, dehiscing irregularly along the side. Seeds black, tuberculate, keeled on the back; hilum subbasal, large. [Name Greek, meaning plains and cactus.]

A monotypic genus of western United States. Type species, *Echinocactus Simpsonii* Engelm.

1. *Pediocactus Simpsonii* (Engelm.) Britt. & Rose. Hedgehog-thistle. Fig. 3336.

Echinocactus Simpsonii Engelm. Trans. St. Louis Acad. 2: 197. 1863.
Echinocactus Simpsonii var. *minor* Engelm. loc. cit.
Mammillaria Simpsonii M. E. Jones, Zoe 3: 302. 1893.
Mammillaria Purpusii Schum. Monatss. Kakteenk. 4: 165. 1894.
Echinocactus Simpsonii var. *robustior* J. M. Coult. Contr. U.S. Nat. Herb. 3: 377. 1896.
Pediocactus Simpsonii Britt. & Rose in Britt. & Brown, Ill. Fl. ed. 2. 2: 570. 1913.

Plants depressed-globose, turbinate at the base, 15-25 cm. in diameter, with strong, contiguous ovoid tubercles 1.5-2 cm. long. Radial spines 10-15, white, acicular, spreading horizontally, 10-25 mm. long; central spines 8-12, stouter and longer than the radials, 1-3 cm. long, white to yellowish at the base, reddish brown to nearly black toward the tips, erect-spreading; flowers 2-3.5 cm. long, crowded in the center of the plant, surrounded by white to brownish wool; outer perianth-segments obtuse, serrulate; inner perianth-segments linear-oblong, acute; filaments, style and stigma-lobes yellow, fruit 6-8 mm. in diameter; seeds asymmetrically obovate, 3 mm. long.

In dry interior mountain valleys and rocky ridges, timberless Arid Transition and Upper Sonoran Zones; central Washington to Nevada. April-May.

10. *CORYPHÁNTHA* (Engelm.) Lemaire, Cactées 32. 1868.

Solitary or cespitose plants with globose to cylindric stems bearing conspicuous, spirally arranged tubercles. Tubercles mammillate, narrowly grooved from apex to base when mature. Flowers borne near the top of the plant in the axils of young tubercles, comparatively large and showy; perianth-segments withering-persistent. Ovary naked or sparsely scaly in some species. Fruit ovoid to oblong, greenish to yellowish. Seeds brown (or black), smooth to finely reticulate; hilum subbasal; embryo curved. [Name Greek, referring to the apical position of the flowers.]

A genus of 40-50 species from the southern United States to central Mexico (one species ranging north to southern Canada). Type species, *Mammillaria sulcolanata* Lemaire.

Central spines 12-14; tubercles broad, less than 1 cm. long. 1. *C. Alversonii*.
 Central spines 2-6; tubercles slender, 12-25 mm. long.
 Tubercles 12-15 mm. long; flowers straw-colored, or tinged with rose or purple toward the tips, 3 cm. broad; radial spines 20-25. 2. *C. desertii*.
 Tubercles 20-25 mm. long; flowers rose to purple, 5-7 cm. broad; radial spines 15-20. 3. *C. arizonica*.

1. *Coryphantha Alversonii* (J. M. Coult.) Orcutt. Foxtail Cactus. Fig. 3337.

Cactus radiosus var. *Alversonii* J. M. Coult. Contr. U.S. Nat. Herb. 3: 122. 1894.
Mammillaria Alversonii Zeiss. Monatss. Kakteenk. 5: 70. 1895.
Mammillaria radiosus var. *Alversonii* Schum. Gesamth. Kakteenk. 481. 1898.
Coryphantha Alversonii Orcutt, Cactography 3. 1926.

Stems simple, or infrequently 1-2-branched at the base, oblong to short-cylindric, 1-2 dm. high, 5-8 (10) cm. in diameter. Tubercles short and thick; radial spines 20-35, acicular, 1-2 cm.

long, white, or slightly tipped with black, closely interlocking-spreading, nearly concealing the stem; central spines much stouter, 10–14, unequal, 1–2.5 cm. long, divaricately spreading, white to ash-yellow at the base, shading through deep maroon to black from about the middle toward the tips; flowers 2.5–3 cm. long, about 1.5 cm. broad when expanded; perianth-segments with rose-colored midveins, shading into light purple toward the margins; outer perianth-segments ciliate-margined; style and stigma-lobes white; fruit clavate, green, naked or nearly so; seeds brown, minutely tuberculate.

Infrequent on rocky mesas and in desert mountain canyons, Lower Sonoran Zone; Morongo Valley to Indio and in the mountains between the Mojave and Colorado Deserts, California. May.

2. *Coryphantha déserti* (Engelm.) Britt. & Rose. Yellow Foxtail Cactus.

Fig. 3338.

Mammillaria déserti Engelm. Bot. Calif. 2: 449. 1880.

Cactus radiosus var. *déserti* J. M. Coul. Contr. U.S. Nat. Herb. 3: 121. 1894.

Mammillaria radiosa var. *déserti* Schum. Gesamtb. Kakteenk. 481. 1898.

Coryphantha déserti Britt. & Rose, Cactaceae 4: 46. 1923, in part.

Simple or very rarely 1–3-branched, globose, ovoid to short-cylindric plant 5–25 cm. high, 6–9 cm. in diameter, densely covered with interlocking spines. Areoles slender, 8–12 mm. long; radial spines 20–25 (30), acicular, unequal, 9–16 mm. long, spreading, white or ash-gray, black-tipped; central spines 2–4, stout, terete, 5–15 mm. long, somewhat spreading, those at top of plant black or blue-black on the upper half, fading through red to white at the base, the whole spine light at base of old plants; flowers straw-colored, tipped with pink or rose, 2.5–3 cm. wide when expanded, outer perianth-segments ciliate; fruit oblong; seeds obliquely obovate, curved, minutely pitted.

Infrequent on rocky hillsides and mesas, Lower Sonoran Zone; Inyo County to the southern edge of the Mojave Desert in eastern San Bernardino County, eastward to Utah. May.

3. *Coryphantha arizonica* (Engelm.) Britt. & Rose. Arizona Foxtail Cactus.

Fig. 3339.

Mammillaria arizonica Engelm. Bot. Calif. 1: 124. 1876.

Cactus radiosus var. *arizonica* J. M. Coul. Contr. U.S. Nat. Herb. 3: 121. 1894.

Mammillaria radiosa var. *arizonica* Schum. Gesamtb. Kakteenk. 481. 1898.

Coryphantha arizonica Britt. & Rose, Cactaceae 4: 45. 1923.

Solitary or in age forming cespitose clumps up to 1 m. wide, each head globose to ovoid, 6–10 cm. in diameter. Tubercles large, 2–2.5 cm. long, cylindric, often slightly curved upward, the groove deep; radial spines 12–20, acicular, rigid, unequal, 1–3 cm. long, spreading but scarcely interlocking, white or ashy; central spines 2–6, stouter, deep brown on upper part, whitish at the base, 1–2.5 cm. long; flowers 5–7 cm. broad, pink to rose; outer perianth-segments linear-subulate, the margins fimbriate; inner perianth-segments alternately linear-lanceolate; fruit oval; seeds compressed, pitted.

On rocky mesas and desert mountain canyons, Lower Sonoran Zone; from eastern San Bernardino County in the vicinity of Cima and Goff eastward into northern Arizona, southern Nevada, and possibly southern Utah. May.

11. *PHELLOSPÉRMA* Britt. & Rose, Cactaceae 4: 60. 1923.

A solitary or few-branched cespitose cactus with globose to cylindrical stems and large fleshy, simple or branched roots. Tubercles terete, not grooved, naked in the axils. Flowers axillary to older tubercles, funnelform. Fruit obovate to narrowly clavate, bright red. Seeds dull black, rugulose, embedded in a thick corky base nearly as large as the seed proper. [Name Greek, referring to the corky base of the seed.]

A monotypic genus of the southwestern United States and adjacent Mexico. Type species, *Mammillaria tetrancistra* Engelm.

1. *Phellosperma tetrancistra* (Engelm.) Britt. & Rose. Yaqui Cactus. Fig. 3340.

Mammillaria tetrancistra Engelm. Amer. Journ. Sci. II. 14: 337. 1852.

Mammillaria Phellosperma Engelm. Proc. Amer. Acad. 3: 262. 1856.

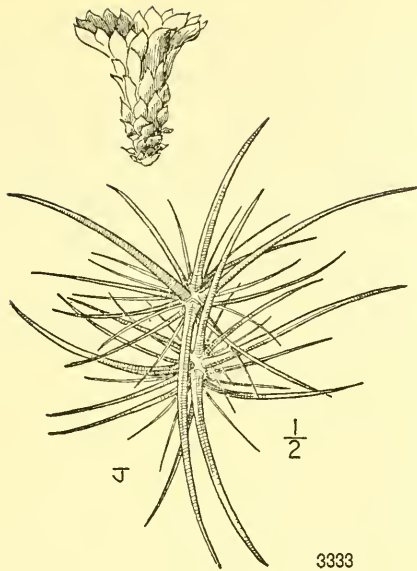
Cactus Phellosperma Kuntze, Rev. Gen. Pl. 1: 261. 1891.

Cactus tetrancistrus J. M. Coul. Contr. U.S. Nat. Herb. 3: 104. 1894.

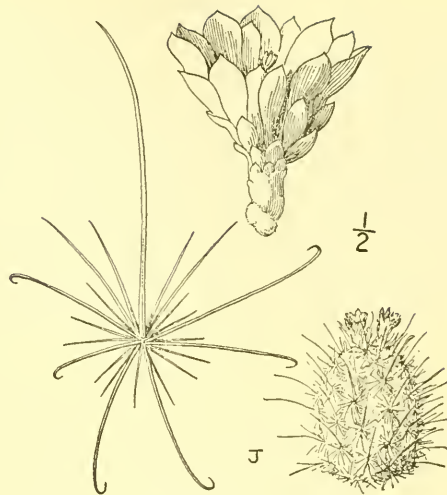
Phellosperma tetrancistra Britt. & Rose, Cactaceae 4: 60. 1923.

Stems oblong to cylindrical, 5–35 cm. high, densely spiny; root carrot-like or branched. Tubercles commonly elongated; radial spines 30–60, acicular, white or slightly darkened toward the tip, spreading, forming a dense white covering; central spines 4 (rarely only 1), from 1 to all of them hooked, 1–2.5 cm. long; flowers 2.5–3.5 cm. long, rose, orchid, or light purple; tube naked, slender, greenish at the base; scales at apex of tube and outer perianth-segments ciliate-margined; style and stigma-lobes cream-colored; fruit 1.5–3.5 cm. long, depressed-umbilicate at the apex; seeds 1.8–2.2 mm. in diameter.

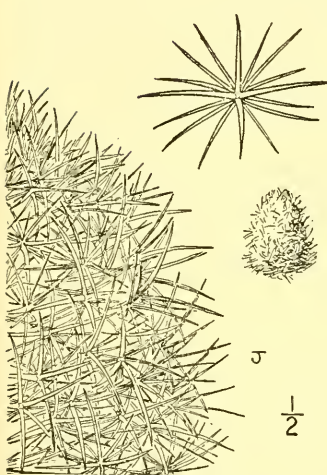
Gravelly or stony slopes and mesas, Lower Sonoran Zone; southern Nevada and Utah to northern Lower California and western Arizona. April.



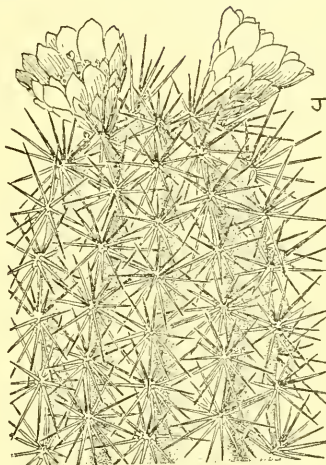
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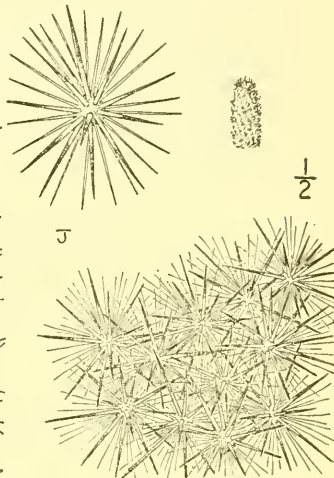
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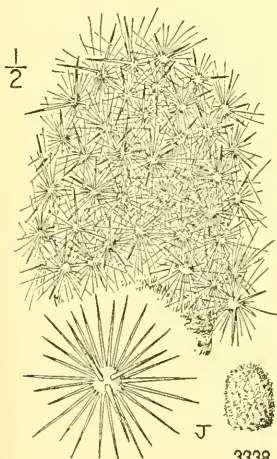
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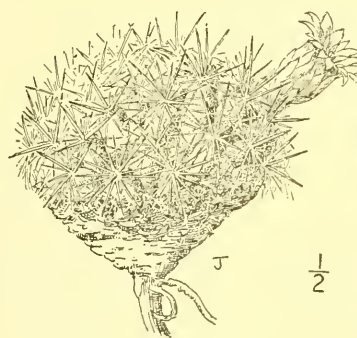
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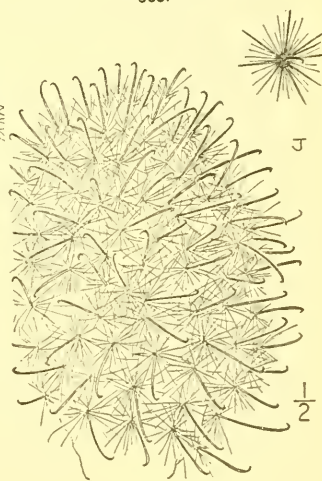
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3333. *Ferocactus acanthodes*
3334. *Echinomastus Johnsonii*
3335. *Sclerocactus polyancistrus*

3336. *Pediocactus Simpsonii*
3337. *Coryphantha Alversonii*
3338. *Coryphantha deserti*

3339. *Coryphantha arizonica*
3340. *Phellosperma tetrancistra*

12. *MAMMILLARIA* Haw. Syn. Pl. Succ. 177. 1812.

Small, globose, to short-cylindric plants with watery or milky juice. Tubercles terete, angled, or flattened, in spiral rows, usually woolly but glandless in the axils and tipped by spine-areoles; spines all alike or (in ours) with central ones differing from the radials, often hooded. Flowers diurnal, axillary to the tubercles, campanulate, small, perianth-segments narrow, spreading. Stamens numerous, borne in lower part of the tube, included. Style equaling stamens. Fruit clavate, naked, scarlet. Seeds brown or (in ours) black, small, shining; embryo curved. [From the Latin word *mammilla*, meaning breast, nipple, in reference to the shape of the tubercles.]

A genus of over 150 species of the southwestern United States and Mexico. Two species occur in the West Indies. Type species, *Mammillaria simplex* Haw. based on *Cactus mammillaris* L.

Outer perianth-segments not ciliate, yellowish; areoles densely woolly when young.

1. *M. dioica*.

Outer perianth-segments ciliate, white tinged with rose or purple; areoles naked.

2. *M. microcarpa*.

1. *Mammillaria dioica* K. Brandg. Strawberry Cactus or Pitayita. Fig. 3341.

Mammillaria dioica K. Brandg. Erythea 5: 115. 1897.

Mammillaria Fordii Orcutt, West Amer. Sci. 13: 49. 1902.

Neomammillaria dioica Britt. & Rose, Cactaceae 4: 158. 1923.

Mammillaria incerta Parish in Jepson, Fl. Calif. 2: 549. 1936.

Solitary or cespitose, plant-body cylindric, 4-25 (33) cm. tall. Axils of tubercles woolly and more or less short-setose; radial spines 10-20, white, or in some the tips rose-colored, purplish, brown or black, 5-8 mm. long, spreading; central spines 1-4, brown, the lower one stouter and hooked; flowers yellowish white with a pink or purplish midrib, 10-20 mm. long, incompletely dioecious; inner perianth-segments usually notched at the apex; styles white or greenish; stigma-lobes yellowish to green; fruit scarlet, ovoid to clavate, 10-25 mm. long; seeds black, shining, minutely pitted.

Grassy hillsides and gravelly slopes, Lower and Upper Sonoran Zones; San Diego County, California, southward along the western side of the mountains to Magdalena Bay, Lower California. Feb.-April.

2. *Mammillaria microcarpa* Engelm. Pincushion Cactus. Fig. 3342.

Mammillaria microcarpa Engelm. in Emory, Notes Mil. Rec. 157. 1848.

Mammillaria Grahamii Engelm. Proc. Amer. Acad. 3: 262. 1856.

Cactus Grahamii Kuntze, Rev. Gen. Pl. 1: 260. 1891.

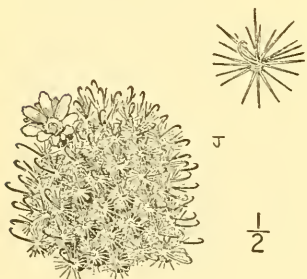
Mammillaria Grahamii var. *arizonica* Quehl, Monatss. Kakteenk. 6: 44. 1896.

Coryphantha Grahamii Rydb. Fl. Rocky Mts. 581. 1917.

Neomammillaria microcarpa Britt. & Rose, Cactaceae 4: 155. 1923.

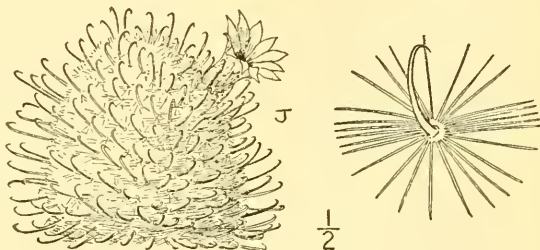
Cespitose or simple plant 4-8 cm. high, with small tubercles becoming corky in age. Axils of tubercles naked; radial spines 15-30, spreading, white or with dark tips, 6-10 mm. long, usually nearly hiding the flesh of the plant; central spines 1-3, dark brown to purplish black, if more than one, the lower stouter and hooked, 12-18 mm. long; flowers near the top of the plant, 2-2.5 cm. long, broadly funnelliform; outer perianth-segments ovate, obtuse; inner perianth-segments obovate, acuminate, with purplish midribs and whitish margins; style purple; stigma-lobes green; fruit clavate, scarlet, 2-2.5 cm. long; seeds black, shining, globose, about 1 mm. in diameter.

Sandy plains, gravelly slopes and rocky ridges, Lower Sonoran Zone; Santa Rosa Mountains, Colorado Desert, California, to southern Utah, southwestern Texas and the desert areas of central Lower California, Sonora and Chihuahua. Feb.-May.



3341

3341. *Mammillaria dioica*



3342

3342. *Mammillaria microcarpa*

Family 103. **THYMELAEACEAE.****MEZEREUM FAMILY.**

Trees, shrubs, or rarely herbs with opposite or sometimes alternate simple exstipulate leaves. Flowers in short racemes or spikes, capitate or rarely solitary, bracteate, regular or slightly irregular, perfect or unisexual. Calyx usually colored and corolla-like, 4-5-lobed. Corolla none. Stamens as many or twice as many as calyx-lobes, inserted on the calyx-tube; anthers basifixed. Disk hypogynous or wanting. Ovary superior, 1-2-celled; style simple; stigma capitate or discoid; ovules 1 in each cell, pendant. Fruit a berry or drupe. Seed solitary or in the 2-celled fruits 2; endosperm present or sometimes none.

A family of 40 genera and about 425 species of wide geographical distribution but mainly tropical. Besides the following native genus, *Daphne* and *Pimelea* are commonly cultivated in our gardens.

1. **DÍRCA** L. Sp. Pl. 358. 1753.

Shrubs, with smooth tough fibrous bark. Leaves deciduous, alternate, entire, short-petioled. Flowers yellow, appearing before the leaves in peduncled clusters of 2-4 from scaly buds at the nodes of the previous season. Calyx campanulate or funnelform, 4-lobed. Stamens 8, exserted, the alternate ones longer. Disk wanting. Ovary sessile, 1-celled; style elongated, very slender; stigma small, capitate. Fruit a red oval-oblong drupe. [Named for a celebrated fountain in Thebes (Boeotia), the plants growing in moist places.]

An American genus of 2 species. *Dirca palustris* L. of eastern North America is the type of the genus.

1. **Dirca occidentàlis** A. Gray. Western Leatherwood. Fig. 3343.

Dirca occidentalis A. Gray, Proc. Amer. Acad. 8: 631. 1873.

Low erect shrub, 1-2 m. high, with mostly erect or ascending branches, smooth very tough leathery bark and soft wood. Leaves obovate-oval, 4-6 cm. long, thin. Flowers in clusters of 2 or 3, more or less deflexed; calyx 8-10 mm., the tube narrowed below, the lobes broadly ovate; stamens 8 or rarely 9 or 10; drupe 6-7 mm. long, ovoid.

Moist wooded hillsides, Humid Transition and Upper Sonoran Zones; locally distributed in Marin, Alameda, and San Mateo Counties, California. Type locality: Oakland Hills, near Oakland, California. Feb.-March.

Family 104. **ELAEAGNACEAE.****OLEASTER FAMILY.**

Shrubs or a few trees, with entire alternate or opposite leaves, mostly silvery-scaly or stellate-pubescent. Flowers perfect, polygamous or dioecious, clustered or rarely solitary, on the nodes of the preceding season. Calyx in the pistillate or perfect flowers with lower part tubular or urceolate and persistent, 4-lobed and deciduous; in the staminate flowers 4-parted. Corolla wanting. Stamens 4 or 8, in the perfect flowers borne on the calyx-throat. Disk annular or lobed. Ovary superior, sessile, 1-celled; style slender, ovule 1, erect, anatropous. Fruit drupe-like, the calyx-base becoming thickened and enclosing the achene or nut. Seed erect; embryo straight; endosperm scanty or none.

A family of 3 genera and about 20 species, widely distributed.

1. **SHEPHÉRDIA** Nutt. Gen. 2: 240. 1818.

Shrub clothed with a brown- or silvery-scurfy or stellate-pubescent. Leaves opposite, entire, petioled, deciduous. Flowers dioecious or polygamous, small, spicate or clustered in the axils or the pistillate solitary. Staminate flowers with a rotate 4-parted calyx; stamens 8, alternating with the lobes of the disk; filaments short. Pistillate flowers with the lower part of calyx urceolate, bearing an 8-lobed disk at the mouth, the upper part 4-cleft. Fruit drupe-like, the fleshy calyx base enclosing the achene. [Name in honor of John Shepherd, at one time curator of the Liverpool Botanic Garden.]

A North American genus of 3 species. Type species, *Hippophae canadensis* L.

Shrub not thorny; leaves green above.

Shrub usually thorny; leaves silvery on both surfaces.

1. *S. canadensis*.

2. *S. argentea*.

1. *Shepherdia canadensis* (L.) Nutt. Canadian Buffalo-berry. Fig. 3344.

Hippophae canadensis L. Sp. Pl. 1024. 1753.

Shepherdia canadensis Nutt. Gen. 2: 240. 1818.

Lepargyrea canadensis Greene, Pittonia 2: 122. 1890.

Erect shrub 1–3 m. high, the branchlets not thorny, silvery-scurfy and brown-scurfy when young. Leaves ovate to oblong-oval, 2.5–6 cm. long, green and glabrous above or somewhat silvery-stellate when young, densely silvery-stellate and brown-scurfy-dotted beneath; flowers brown without, greenish yellow within, 4–5 mm. broad; fruit broadly ellipsoid, 4–6 mm. long, red or yellow, insipid.

Moist woods or stream banks, Canadian Zone; Alaska south along the coast to western Washington, and east of the Cascade Mountains to Grant County, Oregon, east to the Newfoundland, New York, Michigan, Colorado, and Utah. Type locality: Canada. April–June. Bitter Buffalo-berry.

2. *Shepherdia argentea* Nutt. Silvery Buffalo-berry. Fig. 3345.

Elaeagnus argentea Nutt. in Fraser's Cat. 1813. (Nomen nudum.)

Hippophae argentea Pursh, Fl. Amer. Sept. 115. 1814.

Shepherdia argentea Nutt. Gen. 2: 241. 1818.

Lepargyrea argentea Greene, Pittonia 2: 122. 1890.

Elaeagnus utilis A. Nels. Amer. Journ. Bot. 22: 682. 1935.

Shrub or small tree 2–6 m. high, the branches often terminating in thorns. Leaves oblong or oblong-lanceolate, 2.5–5 cm. long, obtuse at the apex, usually cuneate at base, densely silvery-scurfy on both sides; petioles 4–12 mm. long; flowers appearing before the leaves, fasciated at the nodes, brown, 4–5 mm. broad, the pistillate scurfy on the back; fruit broadly ellipsoid, 4–6 mm. long, scarlet to golden-yellow, acid.

Along streams or washes, Arid Transition and Upper Sonoran Zones; Alberta and Manitoba to Kansas and New Mexico; Nevada and southeastern Oregon south to eastern and southern California. Type locality: "On the banks of the Missouri." Collected by Lewis of the Lewis and Clark Expedition. April–May. Sour Buffalo-berry.

Family 105. LYTHRACEAE.

LOOSESTRIFE FAMILY.

Herbs, shrubs, or, in tropical regions, often trees. Leaves opposite, verticillate or rarely alternate, usually exstipulate. Flowers solitary or clustered, perfect, regular. Calyx persistent, free from the ovary, but the tube often enclosing it, 4–6-toothed often with accessory teeth in the sinuses. Petals when present as many as the primary calyx-teeth, inserted with the stamens on the calyx-tube. Anthers versatile, longitudinally dehiscent. Ovary 2–6-celled, or rarely 1-celled; style 1; stigma 2-lobed; ovules many or rarely few, anatropous. Capsule 1- to several-celled, variously dehiscent or indehiscent. Seeds without endosperm.

A family of 21 genera and about 400 species.

Calyx-tube short, campanulate or hemispheric; leaves opposite; petals 4.

Flowers solitary in the axils; capsule septicidally dehiscent; leaves, in ours, narrowed at base, not auriculate-clasping.

Flowers usually more than one in the axils; capsule bursting irregularly; leaves, in ours, auriculate-clasping.

Calyx-tube cylindric; petals usually 6; leaves mainly alternate.

1. *Rotala*.

2. *Ammannia*.

3. *Lythrum*.

1. *ROTALA* L. Mant. 2: 175. 1771.

Low annual mostly glabrous herbs, with 4-angled stems. Leaves opposite or verticillate, usually sessile. Flowers solitary in the leaf-axils, small, 4-merous; calyx-tube campanulate or globose, 4-lobed with accessory teeth in the sinuses. Petals 4, attached to the rim of the calyx-tube. Stamens 4, attached rather low on the calyx-tube; filaments short. Capsule spherical, enclosed by the membranous calyx, 4-celled, septicidally dehiscent. Seeds many, minute, angled. [Name Latin, meaning wheel, in reference to the verticillate leaves in the type species.]

A genus of about 40 species, of wide geographical distribution, especially in tropical regions. Type species, *Rotala verticillaris* L.

1. *Rotala ramòsior* (L.) Koehne. Tooth-cup. Fig. 3346.

Ammannia ramosior L. Sp. Pl. 120. 1753.

Ammannia humilis Michx. Fl. Bor. Amer. 1: 99. 1803.

Boykinia humilis Raf. Aut. Bot. 9. 1840.

Rotala ramosior Koehne in Mart. Fl. Bras. 13²: 194. 1875.

Stems branched from the base or simple, erect or ascending, 5–30 cm. high, 4-angled. Leaves opposite, oblong or linear-oblong, 10–35 cm. long, narrowed to a sessile base or to a short petiole,

not auriculate; flowers solitary or rarely 2-3 in the axils; petals minute, broadly obovate; capsule spheroid, 3 mm. long; seeds very minute, angled, faintly reticulate.

Swamps and edges of ponds, Transition Zone to the tropics; in the Pacific States ranging from southern Washington (Klickitat County) to southern California; also extending to New England and south to tropical South America. Type locality: Virginia. June-Sept.

2. AMMÁNIA [Houst.] L. Sp. Pl. 119. 1753.

Annual glabrous or glabrate herbs, mostly with 4-angled stems, opposite sessile narrow leaves, and small axillary solitary or clustered flowers. Calyx campanulate, globose or ovoid, 4-angled, 4-toothed, often with small accessory teeth in the sinuses. Petals 4, deciduous. Stamens 4-8, inserted on the calyx-tube; filaments slender or short. Ovary enclosed in the calyx-tube, nearly globose, 2-4-celled, bursting irregularly. Seeds numerous, angled and minutely pitted. [Name in honor of Johann Ammann, 1699-1741, a German botanist.]

A genus of approximately 20 species, of wide geographical distribution, most abundant in warm temperate and tropical regions. Type species, *Ammannia latifolia* L.

1. *Ammannia coccinia* Rottb. Long-leaved Ammannia. Fig. 3347.

Ammannia coccinia Rottb. Pl. Hort. Havn. Descr. 7. 1773.

Annual erect glabrous herb, branching below, 1-4 dm. high. Leaves linear-lanceolate, 2-5 cm. long, cordate-auriculate clasping, acute or acuminate at the apex, entire; flowers 2-5 or rarely solitary in each axil, sessile or subsessile; petals purple, 1-2 mm. long, fugacious; fruiting capsule 4 mm. long, slightly exceeded by the calyx; style persistent, about half as long as the capsule.

Swamps and wet banks, Transition to Tropical Zones; of wide geographical range extending from northern United States to Brazil. In the Pacific States it is not abundant but ranges from Klickitat County, Washington, to southern California. Type locality: not ascertained. May-Nov.

Péplis Pórtula L. Sp. Pl. 332. 1753. Common Peplis or Water Purslane. Glabrous annual, creeping and rooting at the base of the branches; leaves obovate or oblong, mostly 5-10 mm. long, narrow at base, entire; flowers minute, sessile in the axils of the leaves; calyx short-campanulate, with 6 outer and 6 smaller inner teeth; petals minute or none; stamens 6; style very short; capsule globose, included in the calyx, barely 2 mm. in diameter. This adventive from Europe has been collected by J. T. Howell, in Summit Valley, Placer County, California.

3. LÝTHRUM L. Sp. Pl. 446. 1753.

Herbs or shrubs with 4-angled stems and opposite, alternate or rarely verticillate, entire leaves. Flowers solitary in the axils, or cymose-paniculate or spicate and terminal, often dimorphous. Calyx-tube cylindric, 8-12-ribbed, 4-6-toothed, with an equal number of appendages in the sinuses. Petals 4-6, attached to the rim of the tube, rarely wanting. Stamens 4-12, inserted rather low on the calyx-tube. Ovary oblong, 2-celled; style filiform; ovules numerous. Capsules included in the calyx-tube, membranous, 2-celled, 2-valved or bursting irregularly. Seeds minute, flat or angled. [Name Greek, meaning gore, from the purple color of the flowers.]

A genus of about 30 species, of wide geographical distribution. Type species, *Lythrum Salicaria* L.

Leaves mainly alternate; flowers axillary and solitary; stamens same number as petals.

Flowers sessile or subsessile; petals 1-2 mm. long; seeds broadly and somewhat obliquely ovoid, nearly as broad as long.

Annual, not stoloniferous.

Perennial, stoloniferous.

Flowers pedicelled; petals 4-6 mm. long; seeds linear-lanceolate in outline, twice as long as wide.

Leaves opposite or verticillate; flowers in a terminal spicate panicle; stamens twice as many as petals.

1. *L. Hyssopifolia*

2. *L. adsurgens*.

3. *L. californicum*.

4. *L. Salicaria*.

1. *Lythrum Hyssopifolia* L. Hyssop Loosestrife or Grass Poly. Fig. 3348.

Lythrum Hyssopifolia L. Sp. Pl. 447. 1753.

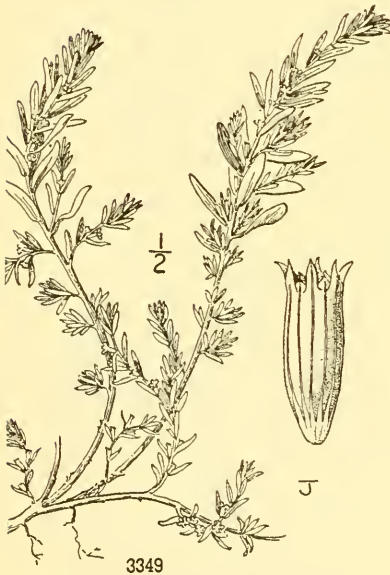
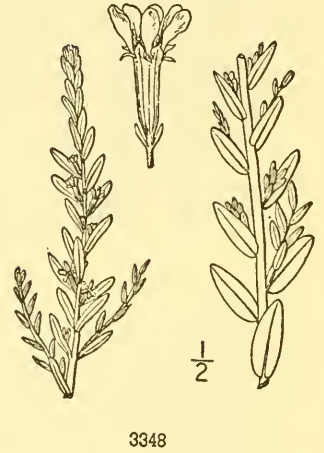
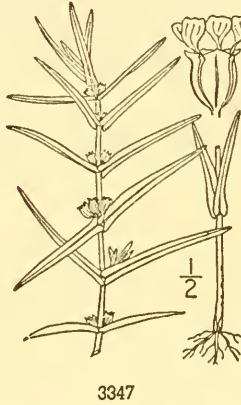
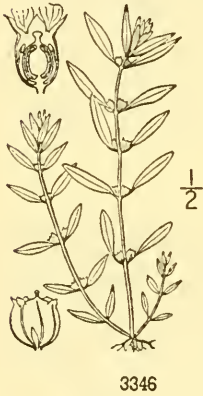
Annual, pale green and glabrous, the stems erect or assurgent, becoming much-branched, 1.5-5 dm. high. Leaves alternate or in young plants opposite near the base, sessile, oblong to linear, obtuse at apex, rounded at base, 8-20 mm. long; flowers solitary and sessile in the axils, not dimorphous; petals erect, rose-colored or white, 1-2 mm. long; stamens included; fruiting calyx-tube cylindric, narrowed at base, 4 mm. long, the teeth lanceolate-subulate, 1 mm. long; seeds obliquely and broadly ovoid, barely 1 mm. long, and nearly as wide.

Moist ground, Boreal and Austral Zones; wide geographical distribution in both the New and Old World; in the Pacific States ranging from Washington to California. Type locality: Europe. April-Oct.

2. *Lythrum adsurgens* Greene. Wallow Poly. Fig. 3349.

Lythrum adsurgens Greene, Pittonia 2: 12. 1889.

Perennial by stolons, branching from the base, the branches prostrate, or ascending, 2-5 dm. long. Leaves linear to oblong, 1-2 cm. long, obtuse or acutish at apex rounded at base, pale green; flowers sessile or subsessile; petals rose-purple to white, 1-2 mm. long; fruiting calyx-



3343. *Dirca occidentalis*
3344. *Shepherdia canadensis*
3345. *Shepherdia argentea*

3346. *Rotala ramosior*
3347. *Ammannia coccinea*
3348. *Lythrum Hyssopifolia*

3349. *Lythrum adsurgens*
3350. *Lythrum californicum*
3351. *Lythrum Salicaria*

tube cylindric, 4 mm. long, the teeth lanceolate, scarcely 1 mm. long; seeds obliquely and broadly ovoid.

Moist ground, Transition and Upper Sonoran Zones; Curry County, Oregon, and Siskiyou Mountains, California, south to southern California. Type locality: "low meadow lands adjacent to the salt marshes of San Francisco Bay, especially about west Berkeley," California. May-Nov.

3. *Lythrum californicum* Torr. & Gray. California Loosestrife. Fig. 3350.

Lythrum californicum Torr. & Gray, Fl. N. Amer. 1: 482. 1840.

Lythrum Sanfordii Greene, Pittonia 2: 12. 1889.

Perennial with rootstocks, the stems mostly erect, paniculately and rather divaricately branching above, 5-15 dm. high, pale green and glabrous. Leaves narrowly linear to linear-oblong, or the lower lanceolate, 1-3 cm. long; flowers distinctly pedicelled; petals 4-6 mm. long, bright purple; calyx-teeth subulate, sharply acute; the tube cylindric, 5-6 mm. long; seeds linear-lanceolate, about 1 mm. long, scarcely half as broad.

Moist ground, mainly Upper Sonoran Zone; central California to northern Lower California. Type locality: California. Collected by Douglas. April-Oct.

4. *Lythrum Salicaria* L. Spiked or Purple Loosestrife. Fig. 3351.

Lythrum Salicaria L. Sp. Pl. 446. 1753.

Perennial, the stems erect, 5-10 dm. high, simple or at length much branched, pubescent or tomentose at least above. Leaves opposite or occasionally in threes, lanceolate, cordate or clasping at the base, 5-7 cm. long; flowers several in the upper axils, forming a dense compound interrupted terminal spike, trimorphous; calyx-teeth subulate, 2 mm. long; petals 6-8 mm. long, bright purple. Stamens 8-10, alternately longer and shorter.

Naturalized from Europe; western Washington, also in the northern Atlantic States. July-Oct.

Lythrum tribracteatum Salzm. ex Tenore, Ind. Sem. Hort. Neap. 13. 1830. Stems prostrate, 5-25 cm. long, rather densely leafy; leaves somewhat decussate, 5-25 mm. long, normally oblong to linear, obtuse; calyx 4-7 mm. long, the teeth and appendages very short; stamens included, irregularly inserted on the corolla-tube. This native of the Mediterranean region has been collected by J. T. Howell (Madroño 2: 20. 1931.) in "beds of summer-dried rain-pools," in the vicinity of Elmira, Solano County, California.

Family 106. ONAGRACEAE.*

EVENING-PRIMROSE FAMILY.

Herbs or rarely shrubs with simple alternate or opposite leaves; stipules none. Flowers perfect, axillary or in terminal racemes, the parts mostly in twos or in fours. Hypanthium adnate to ovary and usually prolonged beyond. Sepals 4 (sometimes 2 or 5). Petals 4 (sometimes 2 or 5), inserted at summit of hypanthium. Stamens as many or twice as many as petals or sepals, borne at summit of hypanthium. Ovary inferior, 4-celled (sometimes 2- or 5-); style 1; stigma 4-lobed, or capitate, or discoid. Fruit a capsule, rarely nut-like.

About 20 genera and 600 species of wide distribution, particularly well represented in western North America.

Sepals persistent.

Petals 5, 1 cm. or more long; stamens 8-12, in 2 series; capsule at length reflexed.

1. *Jussiaea*.

Petals lacking or minute; stamens 3-6, in 1 series; capsule erect.

2. *Ludwigia*.

Sepals deciduous after flowering.

Flowers 4-merous.

Seeds with tuft of hairs (coma) at one end.

Hypanthium 2-3 cm. long and funnellform, with row of 8 scales within at about one-half its length; flowers scarlet.

3. *Zauschneria*.

Hypanthium less than 1 cm. or lacking, no scales within; flowers not scarlet.

4. *Epilobium*.

Seeds without coma.

Fruit a capsule, dehiscent.

Ovary 4-celled.

Anthers innate, attached near base, erect; petals not yellow, but ranging from pink to lavender or rose, sometimes whitish.

Sepals erect; petals small or wanting; pollen in tetrads.

5. *Boissduvalia*.

Sepals reflexed or the tips remaining united and turned to one side in anthesis; pollen not in tetrads.

Petals distinctly clawed, the claw at least one-sixth as long as the blade.

6. *Clarkia*.

Petals not at all or scarcely clawed, the claw not more than one-tenth as long as the blade.

7. *Godetia*.

Anthers usually versatile, attached near the middle; petals yellow or white, often reddish in age.

8. *Oenothera*.

Ovary 2-celled; hypanthium not prolonged beyond the ovary; flowers usually minute; stems capillary.

9. *Gayophytum*.

Fruit indehiscent, nut-like.

Biennials or perennials; anthers all fertile; stigma 4-lobed.

10. *Gaura*.

Annual; anthers opposite the petals sterile; stigma discoid, entire.

11. *Heterogaura*.

Flowers 2-merous; fruit indehiscent, obovoid, bristly with hooked hairs.

12. *Circaea*.

* Text contributed by Philip Alexander Munz.

1. *JUSSIÀEA* L. Sp. Pl. 388. 1753.

Perennial herbs with alternate leaves. Flowers yellow, solitary in leaf-axils, pediceled. Hypanthium not prolonged above ovary. Sepals (in ours) 5, green, quite persistent. Petals 5, obovate, spreading. Stamens twice the number of petals. Ovary (in ours) 5-celled, many-ovuled; stigma capitate. Capsule cylindric-clavate. Seeds (in ours) in 1 row in each cell, covered by a layer from the capsule wall. [Named for Bernard de Jussieu, 1699–1777, founder of the Natural System of Botany.]

About 40 species, in the warm and temperate regions, particularly of America. Type species, *Jussiaea repens* L.

1. *Jussiaea repens* var. *peploïdes* (H.B.K.) Griseb. Yellow Water Weed.
Fig. 3352.

Jussiaea peploides H.B.K. Nov. Gen. & Sp. 6: 97. 1823.

Jussiaea repens var. *peploïdes* Griseb. Cat. Pl. Cubens. 107. 1866.

Jussiaea repens var. *californica* S. Wats. Bot. Calif. 1: 217. 1876.

Jussiaea californica Jepson, Fl. W. Mid. Calif. 326. 1901.

Glabrous perennial herbs with decumbent stems rooting freely at the nodes, 3 to many dm. long. Leaves oblong to spatulate-oblong, obtuse to acute, subentire, plainly and evenly pinnate-veined, the blades 1–4 cm. long, on petioles 1–2.5 cm. long or longer on floating leaves; pedicels 1–4 cm. long in fruit; flower pubescent about the base of stamens and style; sepals lanceolate, 4–7 mm. long; petals yellow, obovate, pinnately veined, 10–14 mm. long; stamens about one-third as long; pistil as long as stamens, sometimes somewhat pubescent at base; stigma globose; capsule hard, quite cylindric, about 2 cm. long, at length reflexed and the sepals deciduous from the mature fruit; seeds large for the order, with a very thick, tough outer coat.

In wet places, Upper Sonoran Zone; Oregon south through the western United States to Central America and South America. Type locality: "in humidis convallis Combeimensis, prope urbem Ibaguè," Colombia. May–Sept.

2. *LUDWÍGIA* L. Sp. Pl. 118. 1753.

Perennial herbs of marshes and wet places; ours with opposite leaves and 4-merous flowers, though the petals may be lacking. Ours with 4 stamens, alternate with the petals and with short filaments. Ovary in ours usually flattened at the broad apex. Capsule in ours short, many-seeded, 4-valved, dehiscent laterally and septicidally or by terminal pores. Seeds minute. [Named in honor of C. G. Ludwig, 1709–1773, professor of botany at Leipzig.]

A genus of about 30 species, of warm and temperate regions, most abundant in North America. Type species, *Ludwigia alternifolia* L.

Hypanthium and capsule with 4 evident longitudinal green bands; bracteoles basal, not more than 1 mm. long or not evident. 1. *L. palustris*.

Hypanthium and capsule without green bands; bracteoles above the base and 1–5 mm. long. 2. *L. natans*.

1. *Ludwigia palustris* var. *americana* (DC.) Fern. & Griscom. American Marsh Purslane. Fig. 3353.

Ludwigia apetala Walt. Fl. Car. 89. 1788.

Isnardia palustris β *americana* DC. Prod. 3: 61. 1828.

Ludwigia palustris var. *americana* Fern. & Griscom, Rhodora 37: 176. 1935.

Glabrous, with stems creeping or floating and with erect branches 1–3 dm. tall. Leaves lanceolate to elliptic-ovate, subentire, acute, the blades 1–2.5 cm. long, usually at least half as wide as long, long-petiolate; flowers solitary, axillary, sessile; sepals deltoid, acute, persistent, 1–2 mm. long; petals lacking; stamens about 1 mm. long; stigma 4-lobed; capsule 3–5 mm. long, oblong, 2–3.5 mm. broad, somewhat 4-angled; seeds yellowish, broadly obovoid, 0.5 mm. long.

About ponds and muddy places, Transition and Canadian Zones; Cascade Mountains of Washington and Oregon south to the Sierra Nevada, California; also throughout the United States and in Canada, Mexico, and Central America. Type locality: eastern North America. June–Sept.

Ludwigia palustris var. *pacifica* Fern. & Griscom, Rhodora 37: 176. pl. 349. figs. 5, 9. 1935. Leaves mostly short-petiolate, leaf-blades of terrestrial form mostly more than 1 cm. long, and one-third to one-fourth as wide; sepals acuminate; capsules 2–2.8 mm. thick. Ponds and muddy places along the coast and in the Coast Ranges from British Columbia to central California. Type locality: Sproat Lake, Vancouver Island, British Columbia.

2. *Ludwigia natans* var. *stipitata* Fern. & Griscom. Southern Marsh Purslane.
Fig. 3354.

Ludwigia natans var. *stipitata* Fern. & Griscom, Rhodora 37: 175. pl. 349. figs. 1, 4. 1935.

Habit as in preceding species. Leaf-blades up to 4.5 cm. long, rhombic-ovate, petiolate; flowers solitary, axillary, short-pedicellate; sepals triangular-acuminate; petals shorter than the sepals, easily shed; pedicel of the capsule 2–4 mm. long; capsule 6–8 mm. long, 3–3.5 mm. broad, somewhat 4-angled, light brown without longitudinal green bands.

Muddy places in ponds and marshes, Lower Sonoran Zone; San Bernardino Valley, San Bernardino County. Known only from the type locality. Aug.–Sept.

3. *ZAUSCHNERIA* Presl, Rel. Haenk. 2: 28. pl. 52. 1835.

Erect or decumbent perennials, somewhat woody and with shredding bark at the base. Leaves sessile or nearly so, opposite or alternate, more or less fascicled. Inflorescence spicate, the flowers large, horizontal, fuchsia-like. Hypanthium scarlet, globose at base, then narrowed into a long tube bearing at the narrow part, and within, 8 lobe-like appendages, 4 erect and 4 deflexed. Sepals 4. Petals 4. Stamens 8, the alternate ones shorter; anthers versatile. Ovary 4-celled; stigma 4-lobed, peltate to capitate. Capsule imperfectly 4-celled, many-seeded. Seeds oblong, narrowed at base, comose at apex. [Named for Dr. M. Zauschner, a professor of natural history at the University of Prague.]

A genus of 5 species, occurring in the western United States and in Mexico. Type species, *Zauschneria californica* Presl.

Leaves narrow, usually less than 6 mm. wide; plants suffrutescent at base.

Leaves 2.5–6 mm. wide, linear to lanceolate, little or moderately fasciculate; flowers 30–40 mm. long.
1. *Z. californica*.

Leaves nearly or quite filiform, not over 2 mm. wide, densely fasciculate; flowers 25–35 mm. long.
2. *Z. cana*.

Leaves ovate-lanceolate to oval, the principal ones over 6 mm. wide; plants strictly herbaceous.

Broadest leaves 7–15 mm. wide, often denticulate, not white-canescens; stems 1.5–3.5 dm. long.

3. *Z. latifolia*.

Broadest leaves 5–8 (rarely 10) mm. wide, subentire, the lower ones usually white-canescens; stems up to 2 dm. high.
4. *Z. septentrionalis*.

1. *Zauschneria californica* Presl. California Fuchsia. Fig. 3355.

Zauschneria californica Presl, Rel. Haenk. 2: 28. pl. 52. 1835.

Zauschneria mexicana Presl, op. cit. 29.

Zauschneria Eastwoodiae Moxley, S.W. Sci. Bull. 1: 23. 1920.

Stems 3–9 dm. tall, suffrutescent at the base, often much-branched, green- to gray-pilose, often very glandular. Leaves green to grayish, lanceolate or linear-lanceolate to linear-oblong, 0.5–4 cm. long, 1.5–6 mm. wide, entire or remotely denticulate, the lower ones sometimes opposite or subopposite, the upper usually alternate, lateral veins not usually evident; inflorescence spicate; hypanthium scarlet, funnelform, globose at base, then narrowed, then gradually ampliate, 2–3 cm. long; sepals erect, lanceolate, 8–10 mm. long; petals 2-cleft, scarlet, 8–15 mm. long; capsule sessile to short-pedicled, linear, 4-angled, 8-nerved, with short beak, often curved, 1.5–2 cm. long, many-seeded; seeds broad, 1.5 mm. long.

Dry slopes and fields, Upper Sonoran Zones; Lake County, California, to northern Lower California. Type locality: Monterey, California. Aug.–Oct.

Zauschneria californica subsp. *angustifolia* Keck, Carnegie Inst. Wash. Pub. No. 520: 221. 1940. Plants suffrutescent at the base; leaves linear, densely tomentose-canescens; flowers 3–4 cm. long. Hills near the coast from Monterey County to San Diego County, California. Also found on Santa Catalina Island. Type locality: Dana Point, Orange County.

Zauschneria californica var. *villòsa* (Greene) Jepson, Man. Fl. Pl. Calif. 667. 1925. (*Zauschneria villosa* Greene, Pittonia 1: 27. 1887.) Very villous with white spreading hairs. Upper Sonoran Zone; Santa Rosa, Santa Cruz, and San Clemente Islands, California. Type locality: Santa Cruz Island.

2. *Zauschneria cana* Greene. Hoary California Fuchsia. Fig. 3356.

Zauschneria californica var. *microphylla* A. Gray, Bot. Calif. 1: 218. 1876.

Zauschneria cana Greene, Pittonia 1: 28. 1887.

Zauschneria microphylla Moxley, S.W. Sci. Bull. 1: 22. 1920.

Like the preceding species except for foliage; stems 3–6 dm. tall, tomentose-canescens, entirely gray, usually not very glandular. Leaves narrowly linear-lanceolate to nearly filiform, not over 2 mm. wide, entire or nearly so, much-fascicled; hypanthium scarlet, 2–3 cm. long; sepals scarlet, 8–10 mm. long; petals 2-cleft, scarlet, 8–12 mm. long; capsule linear, 1.5–2 cm. long, many-seeded, curved or almost straight, beaked or not.

Dry slopes of Upper Sonoran Zone; Monterey County to Los Angeles County, California, including Santa Cruz and Catalina Islands. Type locality: Santa Cruz Island. Aug.–Oct.

3. *Zauschneria latifolia* (Hook.) Greene. Broad-leaved California Fuchsia. Fig. 3357.

Zauschneria californica var. *latifolia* Hook. Bot. Mag. 76: pl. 4493. 1850.

Zauschneria latifolia Greene, Pittonia 1: 25. 1887.

Zauschneria tomentella Greene, op. cit. 26.

Zauschneria glandulosa Moxley, Bull. S. Calif. Acad. 15: 22. 1916.

Zauschneria pulchella Moxley, S.W. Sci. Bull. 1: 27. 1920.

Zauschneria canescens Eastw. ex Moxley, op. cit. 29.

Zauschneria velutina Eastw. ex Moxley, op. cit. 25.

Stems herbaceous, slender, 1.5–5 dm. tall, pilose, somewhat glandular above. Leaves mostly opposite, ovate to lance-ovate, tapering to both ends or rounded at base, sessile, 6–18 mm. wide, denticulate, with lateral veins evident; flowers and fruits as in *Z. californica*.

Largely on dry slopes and ridges, Transition Zone; in the mountains in southern Oregon southward to Tulare County, California, and western Nevada. Type locality: not given. Aug.–Sept.

Zauschneria latifolia var. *viscòsa* (Moxley) Jepson, Man. Fl. Pl. Calif. 667. 1925. (*Zauschneria viscosa*

Moxley, Bull. S. Calif. Acad. 15: 22. 1916; *Z. Hallii* Moxley, S.W. Sci. Bull. 1: 27. 1920; *Z. orbiculata* Moxley, Bull. S. Calif. Acad. 19: 30. 1920; *Z. elegans*. Eastw. ex Moxley, S.W. Sci. Bull. 1: 26. 1920.) Lower plants, 1-3 dm. tall, often much branched and with the branches at right angles to the stem, viscid and glandular. Leaves from broadly ovate and with round base to nearly elliptical, crowded on stem. On exposed ridges at higher altitudes, Upper Transition and Canadian Zones; southern Sierra Nevada to the San Gabriel and San Jacinto Mountains, California. Type locality: Barley Flats, San Gabriel Mountains, Los Angeles County.

Zauschneria latifolia var. *Johnstonii* M. Hilend, Amer. Journ. Bot. 16: 67. 1929. Plants usually over 3 dm. tall, coarse, very leafy, villous, often glandular and clammy. Leaves broadly lanceolate to elliptical, not crowded on stem, mostly opposite. Dry slopes, mountains of southern California, at an elevation of 3,500-6,500 feet. Type locality: San Jacinto Mountains.

4. *Zauschneria septentrionalis* Keck. Northern California Fuchsia. Fig. 3358.

Zauschneria septentrionalis Keck, Carnegie Inst. Wash. Pub. No. 520: 219. 1940.

Herbaceous perennial with matted stems 1-2 dm. high. Leaves broadly lanceolate to oval, 4-8 mm. wide, 10-25 mm. long, entire or sometimes obscurely denticulate, white-canescens below, sometimes greenish and villous above; flowers 28-32 mm. long; capsules as in *Z. californica*.

Rocky ledges, Transition Zone; Humboldt County to northern Mendocino County and adjacent southwestern Trinity County, California. Type locality: mouth of South Fork of Trinity River, Humboldt County. Aug.-Sept.

4. *EPILÒBIUM* L. Sp. Pl. 347. 1753.

Mostly herbs, sometimes suffruticose; annual, or usually perennial and wintering by rosettes or turions. Leaves opposite or alternate, nearly or quite sessile, denticulate or entire. Flowers axillary or in terminal racemes or panicles, perfect. Hypanthium short or not prolonged at all above the ovary. Sepals 4, usually notched, purplish, pink, or white, even yellow. Stamens 8, the alternate ones shorter. Stigma oblong or 4-lobed. Capsule elongate, subcylindric to fusiform or clavate, 4-celled, loculicidal. Seeds with tuft of silky hairs (coma) at upper end. [Name Greek, meaning upon a pod, flowers and capsule appearing together.]

Over 100 species, cosmopolitan except in the tropics. Type species, *Epilobium hirsutum* L.

Hypanthium not prolonged above the ovary; flowers large, slightly irregular, the petals 1-2 cm. long, entire, spreading. (Subgenus *Chamaecrion*)

Style pilose at base, exceeding stamens; leaves 5-20 cm. long, membranaceous, reticulate-veiny beneath, with lateral veins confluent in marginal loops; racemes many-flowered, elongate, not leafy; seeds oblong, 1-1.3 mm. long. 1. *E. angustifolium*.

Style glabrous, shorter than stamens; leaves 2-6 cm. long, thick and fleshy, glaucous, not veiny; racemes few-flowered, short, leafy; seeds fusiform, 2 mm. long. 2. *E. latifolium*.

Hypanthium prolonged above the ovary; flowers usually smaller, regular, the petals ascending. (Subgenus *Eupilobium*)

Flowers large, the petals 14-20 mm. long; stigma evidently lobed.

Petals purplish or rose-colored; plants caespitose, suffrutescent.

Leaves rounded at base, denticulate, 1-2 cm. long, subsessile; hypanthium 2-4 mm. long.

3. *E. obcordatum*.

Leaves acute at base, quite entire, 3-4 cm. long, petioled; hypanthium 1-1.5 mm. long.

4. *E. rigidum*.

Petals yellow; plants with creeping underground rootstocks and turions; stems subsimple.

5. *E. luteum*.

Flowers smaller, the petals 2-12 mm. long; stigma usually oblong.

Plant suffrutescent with several stems from woody caudex and 1-2 dm. tall, pubescent throughout.

6. *E. nivium*.

Plant not suffrutescent.

Annuals; stems with exfoliating epidermis; plants of dry situations.

Stems 3-9 dm. tall, glabrous except in upper parts; leaves usually alternate with fascicles in axils; hypanthium 1-3 (8) mm. long. 7. *E. paniculatum*.

Stems 0.5-3 dm. tall, puberulent throughout; leaves mostly opposite, without fascicles; hypanthium scarcely 1 mm. long. 8. *E. minutum*.

Perennials (except sometimes *E. californicum*); epidermis not exfoliating; mostly in moist situations.

Rootstocks bearing turions (globose or ovoid winter-buds with fleshy overlapping scales) which may be rather loose in *E. glandulosum*.

Leaves linear-oblong, sessile, nearly entire, obtuse, with margin slightly revolute; rare, very northern part of our range. 9. *E. palustre*.

Leaves lanceolate to ovate, not at all revolute.

Leaves quite sessile.

Flowers rather large, the petals 5-10 mm. long; stems simple to divaricately branched.

Hypanthium narrow; sepals suberect; stems coarse, simple or virgately few-branched above. 10. *E. glandulosum*.

Hypanthium about as wide as long; sepals more divaricate; stems rather slender, freely spreading-branched above. 11. *E. exaltatum*.

Flowers smaller, the petals 2-5 mm. long; stems simple.

Stems glabrous to pubescent, but not with decurrent lines of hair from leaf-bases. 12. *E. brevistylum*.

Stems with decurrent lines of hair from the leaf-bases.

13. *E. Halleanum*.

Leaves (at least some of them) distinctly short-petioled.

Petals 5-8 mm. long; stems simple.

14. *E. delicatum*.

Petals 3-4 mm. long; stems usually branched.

15. *E. leptocarpum*.

Rootstocks not turioniferous.

Plant pallid, glaucous and glabrous almost throughout; montane.

Plant not glaucous, but green or canescent.

17. *E. glaberrimum*.

Stems 1-3 dm. tall, simple above, with few pairs of opposite leaves; high montane.

Leaves sessile, oblong or linear, suberect; stem slender.

16. *E. oregonense*.

Leaves more or less distinctly petioled and spreading.

Plant densely caespitose, stoloniferous; stems sigmoidally bent, 1-1.5 dm. tall; petals purplish to rose-colored, 4-6 mm. long; leaves 1-2 cm. long.

Capsule linear, slender, 1 mm. or less thick, 2-4 cm. long; seeds smooth, 1 mm. long; buds nodding.

18. *E. alpinum*.

Capsule subclavate, stouter, 1.5-2 mm. thick, 2-2.5 cm. long; seeds papillose, 1.5-2 mm. long; buds erect.

19. *E. clavatum*.

Plant not so densely caespitose; stems erect, 1-3 dm. tall; leaves 1.5-5 cm. long.

Petals purplish, 5-8 (12) mm. long; seeds papillose, 1 mm. long.

20. *E. Hornemannii*.

Petals white or with pink tips, about 3 mm. long; seeds smooth, 1 mm. long.

21. *E. lactiflorum*.

Stems 3-10 dm. tall, usually freely branched, especially above; innovation by rosettes.

Petals 2-6 mm. long, white to purplish; stems greenish to light colored, glandular to canescent especially above; many of upper leaves alternate.

Inflorescence glandular-pubescent.

22. *E. adenocaulon*.

Inflorescence whitish-pubescent, not glandular.

23. *E. californicum*.

Petals 6-10 mm. long, purplish; stems reddish, canescent above; leaves mostly opposite.

24. *E. franciscanum*.

1. *Epilobium angustifolium* L. Fireweed. Fig. 3359.

Epilobium angustifolium L. Sp. Pl. 347. 1753.

Chamaenerion angustifolium Scop. Fl. Carn. ed. 2. 1: 271. 1772.

Epilobium spicatum Lam. Fl. Franc. 3: 482. 1778.

Epilobium angustifolium var. *pygmaeum* Jepson, Fl. Calif. 2: 565. 1936.

Perennial, with erect, mostly simple and few stems, 0.5-2.5 m. tall, glabrous below, commonly puberulent above. Leaves alternate, lanceolate to linear-lanceolate, acute, nearly entire, paler below, with lateral veins confluent in submarginal loops, sessile or nearly so, 5-15 (20) cm. long; flowers numerous in long terminal racemes, with small almost linear bracts; pedicels 5-12 mm. long; hypanthium not prolonged above ovary; sepals lance-linear, 8-12 mm. long, commonly canescent-puberulent throughout, tinged lavender; petals lilac-purple, rose, or even white, clawed, obovate, 8-18 mm. long; stamens 8, in a single series, often unequal, shorter than the petals; filaments dilated below; style hairy at base, exceeding stamens; stigma-lobes slender and elongate; capsule 5-7 cm. long; seeds oblong; 1-1.4 mm. long, with long dingy coma.

In disturbed areas, especially burns, in fairly moist places, Upper Sonoran and Transition Zones; Alaska to southern California east to the Atlantic coast; also Eurasia. A variable species for which many forms and varieties have been proposed. Type locality: Europe. July-Sept.

2. *Epilobium latifolium* L. Broad-leaved Willow-herb. Fig. 3360.

Epilobium latifolium L. Sp. Pl. 347. 1753.

Chamaenerion latifolium Sweet, Hort. Brit. ed. 2. 198. 1830.

Stems several from a caespitose rootstock, depressed or arched-ascending, 1-6 dm. tall, glabrous below, puberulent above. Leaves elliptic-ovate to lanceolate, subopposite, fleshy, glaucous on both surfaces, entire, not veiny, acute, quite sessile, 2-6 cm. long; racemes short, few-flowered, leafy-bracted; pedicels 5-10 mm. long; sepals lanceolate, purplish, 13 mm. long; petals purple, rose-colored, or even white, purple-veined, rhomboid-obovoid, 1.5-2.5 cm. long; stamens 8, in one series, about two-thirds the length of the petals; style glabrous, shorter than stamens; stigma-lobes oblong; capsule canescent, 5-8 cm. long; seeds fusiform, 2 mm. long.

Wet places along streams, Arctic Alpine Zone; Arctic America to Mono County, California, east to Colorado; also Eurasia. Type locality: Siberia. July-Sept.

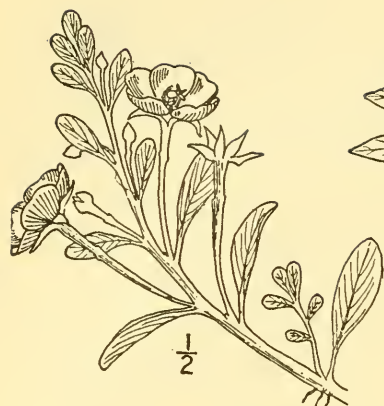
3. *Epilobium obcordatum* A. Gray. Rock-fringe. Fig. 3361.

Epilobium obcordatum A. Gray, Proc. Amer. Acad. 6: 532. 1865.

Epilobium obcordatum var. *puberulum* Jepson, Man. Fl. Pl. Calif. 669. 1925.

Stems several from caespitose suffrutescent base, decumbent, 5-15 cm. tall, simple, glabrous below, usually minutely puberulent at summit, leafy. Leaves opposite, usually crowded, glabrous and glaucous, ovate, obscurely and remotely denticulate, 6-10 mm. long, obtuse, sessile or on short winged petioles; flowers 1 to few, borne singly in uppermost axils; pedicels 2-20 mm. long, slender; hypanthium funnelliform, 2-4 mm. long; sepals lanceolate, purplish, 9-12 mm. long; petals rose-purple, broadly obcordate, 12-20 mm. long; stamens 8, in 2 series, the shorter ones one-half, the longer two-thirds the length of the petals; style purplish, equaling petals, glabrous; stigma-lobes short; capsule cylindric-clavate, 2.5-3.5 cm. long; seeds 1.5 mm. long, finely papillose.

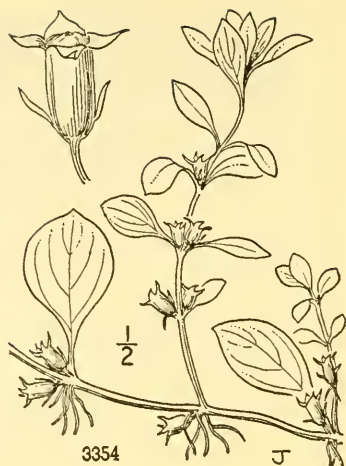
Ridges and slopes, Hudsonian and Arctic-Alpine Zones; Cascade Mountains, central Oregon to the Sierra



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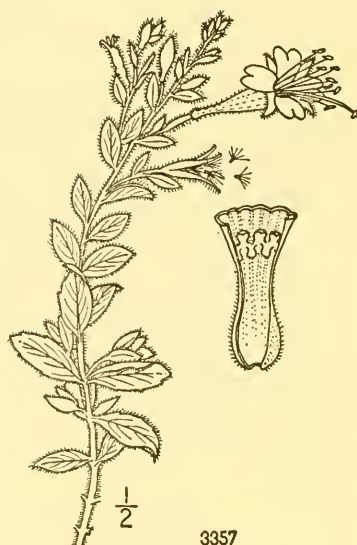
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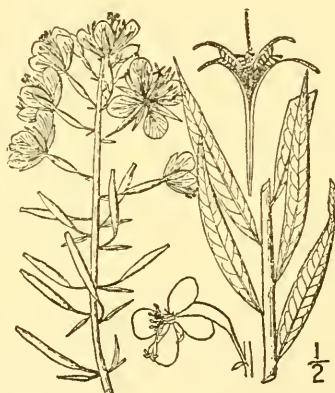
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3352. *Jussiaea repens*
 3353. *Ludwigia palustris*
 3354. *Ludwigia natans*

3355. *Zauschneria californica*
 3356. *Zauschneria cana*
 3357. *Zauschneria latifolia*

3358. *Zauschneria septentrionalis*
 3359. *Epilobium angustifolium*
 3360. *Epilobium latifolium*

Nevada, California, east to Idaho and Nevada. Type locality: Squaw Valley, Tahoe region, California. July–Sept.

Epilobium obcordatum var. *laxum* (Hausskn.) Dempster ex Jepson, Fl. Calif. 2: 566. 1936. (*Epilobium obcordatum* f. *laxum* Hausskn. Mon. Epilob. 251. 1884.) Leaf-blades 10–22 mm. long, subacute. Hudsonian Zone of Trinity, Siskiyou, and Placer Counties, California. Type locality: not given.

4. *Epilobium rigidum* Hausskn. Stiff Willow-herb. Fig. 3362.

Epilobium rigidum Hausskn. Oest. Bot. Zeitschr. 29: 51. 1879.

Epilobium rigidum var. *canescens* Trelease, Rep. Mo. Bot. Gard. 2: 83. 1891.

Resembling the preceding species, but somewhat taller, canescently pubescent above or even throughout. Leaves 3–4 cm. long, obscurely if at all denticulate, acute or nearly so at both ends, cuneately narrowed into petioles 5–8 mm. long; flowers rather few in axils of reduced upper leaves; hypanthium 1–1.5 mm. long; sepals 9–10 mm. long; petals, stamens, pistil much as in the preceding; capsules densely white-glandular, 2–2.5 cm. long; seeds apparently smooth, about 2 mm. long.

Dry stream beds, Transition and Canadian Zones; Siskiyou Mountains, Josephine County, Oregon. Type locality: "Coast Range, California. Lat. 42°." July–Aug.

5. *Epilobium luteum* Pursh. Yellow Willow-herb. Fig. 3363.

Epilobium luteum Pursh, Fl. Amer. Sept. 1: 259. 1814.

Perennial, with creeping underground rootstock and turions; stem subsimple, erect, 1.5–7 dm. tall, glabrous except for the pubescence in decurrent lines above. Leaves 2–7 cm. long, ovate to ovate-lanceolate, quite glabrous, acute to acuminate, sessile or nearly so, sinuate-dentate, the teeth gland-tipped; inflorescence glandular-pubescent; flowers few, in axils of somewhat reduced upper leaves; pedicels 1–2 cm. long; hypanthium campanulate, 1.5 mm. long; sepals lanceolate, 10–12 mm. long; petals yellow, obcordate, 14–18 mm. long; stamens 8, in 2 series, one-half and two-thirds the length of the petals; style exceeding petals, obconic toward apex and 4-parted; capsule linear, 4–7 cm. long; seeds obovoid, quite smooth, 1.25 mm. long, coma reddish.

Wet places, Canadian and Hudsonian Zones; from Alaska to Oregon. Type locality: northwest coast of America. July–Aug.

Epilobium suffruticosum Nutt. in Torr. & Gray, Fl. N. Amer. 1: 488. 1840. Said to have come originally from "Oregon near Walla Walla," occurs from Montana and Wyoming at least as far west as Idaho, and is doubtful for our range. Characterized by its suffruticose habit; lanceolate, sessile, mostly opposite, cinereous-strigose leaves which are 1–2.5 cm. long; pale yellow flowers with petals 5–8 mm. long; capsules 1.5–2.5 cm. long, and seeds 2.5–3 mm. long.

6. *Epilobium nivium* Brandg. Snow Mountain Willow-herb. Fig. 3364.

Epilobium nivium Brandg. Zoe 3: 242. 1892.

Suffrutescent with several stems from a short, branched caudex, 1–2 dm. tall, pubescent throughout. Leaves oblong- to elliptic-lanceolate, thick, not veiny, entire, tipped with stout gland, sessile or short-petioled, 8–15 mm. long; flowers few, in axils of upper leaves; pedicels 3–5 mm. long; hypanthium reddish, enlarged above ovary, narrow, 5–7 mm. long; sepals lanceolate, 3–5 mm. long; petals violet-purple, obcordate, 7–10 mm. long; stamens in 2 sets, the longer one-half the length of the petals; pistil equaling petals; stigma with 4 short lobes; capsule subfusiform, stout, 10–12 mm. long; seeds rather few, smooth, with dingy coma.

Dry slopes, Canadian Zone; Inner North Coast Ranges of California. Type locality: Snow Mountain, Lake County, California. Sept.

7. *Epilobium paniculatum* Nutt. Panicked Willow-herb. Fig. 3365.

Epilobium paniculatum Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 490. 1840.

Epilobium paniculatum f. *bracteata* Hausskn. Mon. Epilob. 247. 1884.

Erect annual with simple stem and shreddy epidermis below, paniculately branched above, 3–9 (20) dm. tall, glabrous except for the tips of the inflorescence which are usually slightly glandular-puberulent. Leaves linear-lanceolate to linear, 2–3 (5) cm. long, usually alternate, short-petioled, remotely denticulate, with thickened acute tip and teeth, quite early deciduous and with fascicles of smaller leaves in axils; flowers in lax racemes on filiform branches of the panicle; bracts subulate; pedicels 5–15 mm. long, usually slightly glandular-puberulent; hypanthium 2–3 mm. long, usually glabrous; sepals 2–3 mm. long; petals pink to almost white, 3–6 mm. long, deeply 2-cleft, rotate; stamens about one-third the length of petals; style about one-half the length of petals; capsule 2–2.5 cm. long, 4-angled, linear-clavate, beaked, usually slightly glandular-puberulent; seeds obovoid, flattened, 2 mm. long, with tawny coma.

Open, usually rather dry ground, Upper Sonoran and Transition Zones; British Columbia to southern California, east to South Dakota and New Mexico. A variable species. Type locality: "plains of the Oregon and Rocky Mountains." June–Sept.

Epilobium paniculatum f. *adenoclâdon* (first spelled *adenoclada*) Hausskn. Mon. Epilob. 247. 1884. (*Epilobium adenoclâdon* Rydb. Bull. Torrey Club 33: 146. 1906; *E. paniculatum* f. *adenocaulon* Hausskn. loc. cit.; *E. apricum* Suksd. W. Amer. Sci. 11: 77. 1901; *E. jucundum* var. *viridifolium* Suksd. Werdenda 1: 29. 1927.) Pedicels and capsules glandular-puberulent, the pedicels densely so; flowers as in the species. With the range of the species and very common. Type locality: mountains of Colorado.

Epilobium paniculatum f. *subulatum* (spelled *subulata* originally) Hausskn. loc. cit. (*Epilobium subulatum* Rydb. Bull. Torrey Club 40: 64. 1913; *E. paniculatum* var. *subulatum* Fernald, Rhodora 37: 324. 1935, as to name.) Pedicels and capsules entirely glabrous; flowers as in the species. With the range of the species; fairly common. Type locality: on the Columbia River.

Epilobium paniculatum f. *Tracyi* (Rydb.) St. John, Fl. S.E. Wash. 275. 1937. (*Epilobium Tracyi* Rydb. Bull. Torrey Club 40: 63. 1913.) Hypanthium less than 2 mm. long; flowers whitish. Washington to California and east to Montana and Ontario. Type locality: Ogden, Utah.

Epilobium paniculatum f. *laevicaule* (Rydb.) St. John, loc. cit. (*Epilobium laevicaule* Rydb. Bull. Torrey

Club 40: 64. 1913; *E. altissimum* Suksd. Werdenda 1: 28. 1927.) Hypanthium 4–6 mm. long; petals 5–8 mm. long, rose to pink. Transition Zone, Washington to California and east to Montana and Colorado. Type locality: Manhattan, Montana.

Epilobium paniculatum var. *jucundum* (A. Gray) Trelease, Rep. Mo. Bot. Gard. 2: 85. 1891. (*Epilobium jucundum* A. Gray, Proc. Amer. Acad. 12: 57. 1876; *E. Hammondii* Howell, Fl. N.W. Amer. 1: 224. 1903.) Hypanthium 8–15 mm. long; petals 7–12 mm. long, purplish. Transition Zone, southern Washington to northern California and Idaho. Type locality: Scott Valley, Siskiyou County, California.

8. *Epilobium minutum* Lindl. Minute Willow-herb. Fig. 3366.

Epilobium minutum Lindl. ex Hook. Fl. Bor. Amer. 1: 207. 1834.

Crossostigma Lindleyi Spach, Ann. Mus. Paris II. 4: 404. 1835.

Epilobium adscendens Suksd. Deutsch. Bot. Monatss. 18: 87. 1900.

Annual, 5–30 cm. tall, from simple or nearly so to diffusely branched, branches erect, often opposite, puberulent throughout. Leaves mostly opposite, oblong-lanceolate to lanceolate or oblanceolate, entire or remotely denticulate, rather fleshy, 1–2 cm. long, on a much shorter but distinct petiole; flowers in axils of upper somewhat reduced leaves; pedicels 3–10 mm. long; hypanthium less than 1 mm. long; sepals about 1.5 mm. long; petals rose-lavender to white, emarginate, 2–4 mm. long; stamens and style about one-half as long as petals; capsule subclavate, arcuate, 1.5–2.5 cm. long, beaked; seeds broadly obovoid, smooth, scarcely 1 mm. long.

Open disturbed, dry places, Upper Sonoran and Transition Zones; British Columbia to central California, and east to Montana and Nevada. Type locality: "near the Grand Rapids of the Columbia." Collected by Douglas. May–Aug.

Epilobium minutum var. *foliosum* Torr. & Gray, Fl. N. Amer. 1: 490. 1840. (*Epilobium minutum* var. *Biolettii* Greene, Pittonia 2: 296. 1892; *E. foliosum* Suksd. Deutsch. Bot. Monatss. 18: 87. 1900.) Flowers smaller, petals scarcely 2 mm. long; leaves narrower, with some tendency to fascicles in axils. With the species. Type locality: "Dry rocks, Oregon and the Rocky Mountains of California." Collected by Nuttall.

9. *Epilobium palustre* L. Marsh Willow-herb. Fig. 3367.

Epilobium palustre L. Sp. Pl. 348. 1753.

Perennial, with filiform sobols ending in well-formed turions; stems simple or few-branched, 1–3 dm. tall, glabrate below, quite canescent above with incurved hairs. Leaves mostly opposite, lanceolate or oblong, obtuse, slightly revolute, not crowded, almost or quite sessile, 1–3 (5) cm. long; fruiting pedicels 1–3 cm. long; sepals 3 mm. long; petals 4–5 mm. long, emarginate, pale; capsule slender, suberect, 3–6 cm. long, canescent; seeds 1.5–2 mm. long, papillate, with pale brownish or white coma.

Wet places in high mountains, Transition Zone; Alaska to Washington, east to New Brunswick; also Eurasia. Type locality: Europe. June–Aug.

Epilobium leptophyllum Raf. Précis des Découv. 41. 1814. (*Epilobium lineare* Muhl. Cat. 39. 1813, an illegitimate name.) Has been collected in Klickitat and Skamania Counties, Washington. It differs from *E. palustre* in its more branched habit and narrower, petioled, more acute and more revolute leaves, which are more pubescent. Ranging east to Colorado, Delaware, and New Brunswick.

10. *Epilobium glandulosum* Lehm. Glandular Willow-herb. Fig. 3368.

Epilobium glandulosum Lehm. Stirp. Pug. 2: 4. 1830; Hook. Fl. Bor. Amer. 1: 206. 1834.

Perennial, apparently with large loosely formed turions; stems 3–9 dm. tall, rather thick, light-colored, simple or few-branched above, glabrous below, crisp-pubescent and glandular above. Leaves crowded near summit, not conspicuously decreased in size in the inflorescence, ovate to ovate-lanceolate, prominently serrulate, 5–12 cm. long, nearly or quite sessile; flowers erect, near end of stem; pedicels 1–2 cm. long in fruit; hypanthium narrow, 2–3 mm. long; sepals suberect, 3–5 mm. long; petals purple, 5–10 mm. long, not conspicuously spreading; capsule 4–7 cm. long, pubescent; seeds about 1.75 mm. long, with dingy coma.

Wet places, Transition and Canadian Zones; Alaska to northern California, eastern Canada and Colorado; also Japan. Type locality: Cumberland-House Fort, on the Saskatchewan. July–Aug.

11. *Epilobium exaltatum* Drew. Elevated Willow-herb. Fig. 3369.

Epilobium exaltatum Drew, Bull. Torrey Club 16: 151. 1889.

Epilobium Sandbergii Rydb. Bull. Torrey Club 40: 64. 1913.

Epilobium californicum var. *exaltatum* Jepson, Man. Fl. Pl. Calif. 670. 1925.

Epilobium glandulosum var. *exaltatum* Munz, Man. S. Calif. 333, 559. 1935.

Epilobium brevistylum var. *exaltatum* Jepson, Fl. Calif. 2: 570. 1936.

Perennial, with large turions; stems 3–9 dm. tall, rather slender, more or less pubescent, freely branched above with very slender branches. Leaves lance-ovate, serrulate, nearly or quite sessile, 5–12 cm. long, the uppermost much reduced; flowers near ends of glandular-pubescent branches; pedicels 5–10 mm. long in fruit; hypanthium 2–3 mm. long, almost as wide; sepals suberect, 3–4 mm. long; petals pink to rose-purple, 5–10 mm. long; capsules 3–5 cm. long; seeds beaked, rugose, 1 mm. long; coma white.

Wet places, Transition Zone; southern Washington to the San Bernardino Mountains, California, east to Idaho and Nevada. Type locality: Grouse Creek, Humboldt County, California. June–Aug.



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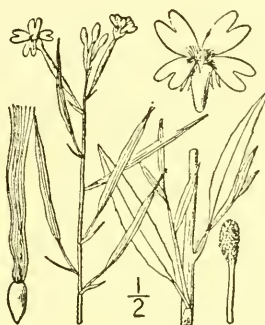
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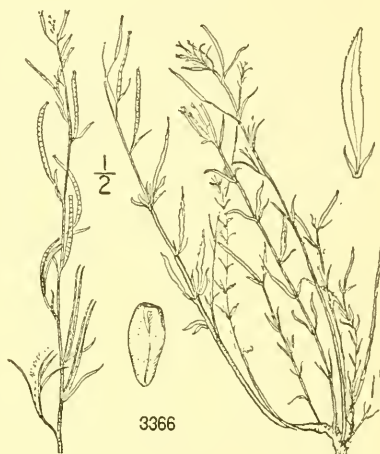
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3361. *Epilobium obcordatum*
 3362. *Epilobium rigidum*
 3363. *Epilobium luteum*

3364. *Epilobium nivium*
 3365. *Epilobium paniculatum*
 3366. *Epilobium minutum*

3367. *Epilobium palustre*
 3368. *Epilobium glandulosum*
 3369. *Epilobium exaltatum*

12. *Epilobium brevistylum* Barbey. Slender Willow-herb. Fig. 3370.

Epilobium brevistylum Barbey, Bot. Calif. 1: 220. 1876.

Perennial with well-formed, compact turions, the dried scales of which persist at the base of the stem of the succeeding year; stems erect, simple or subsimple, slender, 2–6 dm. tall, glabrous below, crisp-pubescent or somewhat glandular about the inflorescence. Leaves ovate to elliptic-lanceolate or even linear-lanceolate, denticulate, with rounded, sessile base, almost entirely opposite, 2–4 cm. long, not crowded, drying pale; flowers several, but not in great numbers; fruiting pedicels 5–15 mm. long; sepals 2–3 mm. long; petals purplish or paler, emarginate, 3–5 mm. long; capsules 4–6 cm. long; seeds about 1.5 mm. long, papillate, broad, with whitish coma.

Wet places, Transition and Hudsonian Zones; Washington to southern California, east to Montana and Colorado. Type locality: Sierra County, California. June–Aug.

Epilobium brevistylum var. *ursinum* (Parish) Jepson, Man. Fl. Pl. Calif. 670. 1925. (*Epilobium Smithii* Lévl. Rep. Nov. Spec. 5: 8. 1908.) Simple, 2–5 dm. tall; both leaves and lower stem pilose with remote and spreading, long, white hairs. With the species from Washington to southern California and Idaho. Type locality: San Bernardino Mountains, California.

Epilobium brevistylum var. *subfalcatum* (Trelease) Munz. (*Epilobium ursinum subfalcatum* Trel., Rep. Mo. Bot. Gard. 2: 101. 1891; *Epilobium brevistylum* var. *Pringleanum* (Hausskn.) Jepson, Man. Fl. Pl. Calif. 670. 1925.) Low, 10–15 cm. tall, with a short, dense, pilose pubescence throughout; leaves oblong-linear, remote, entire or nearly so, erect, obtuse, sessile, of only 3–5 pairs. Occasional in similar situations to the species; Washington to the mountains of central California, Idaho, and Nevada. Type locality: "California, mountains about the headwaters of the Sacramento River."

Epilobium brevistylum var. *ténue* (Trelease) Jepson, Man. Fl. Pl. Calif. 670. 1925. (*Epilobium delicatum* var. *tenué* Trel., Rep. Mo. Bot. Gard. 2: 99. 1891.) Like the preceding variety and growing with it, but glabrous. Rare. Type locality: Union County, Oregon.

13. *Epilobium Halleænum* Hausskn. Hall's Willow-herb. Fig. 3371.

Epilobium Halleænum Hausskn. Mon. Epilob. 261. 1884.

Perennial, with small turions; stems erect, slender, simple or nearly so, 1–4 dm. high, subglabrous below, with lines of hair from the decurrent bases of the leaves, glandular-puberulent in upper parts. Leaves lance-linear, erect, some with clasping base, 1.5–4 cm. long, serrulate to entire, acute; flowers small; hypanthium 1–1.5 mm. long; sepals 2–3 mm. long; petals 2–4 mm. long, white to purplish; fruiting pedicels 3–5 mm. long; capsules 2–5 cm. long; seeds 1–1.5 mm. long, beaked.

Wet places, Transition Zones, British Columbia to northern California, Montana, and Colorado. Type locality: Oregon. July–Aug.

14. *Epilobium delicatum* Trel., Delicate Willow-herb. Fig. 3372.

Epilobium delicatum Trel., Rep. Mo. Bot. Gard. 2: 98. 1891.

Perennial producing turions, the stems slender, mostly simple, glabrous except for the crisp hairy lines decurrent from the upper nodes, and with glandular inflorescence. Leaves opposite, ovate-lanceolate, up to 7.5 cm. long, divergent, rounded at base and subsessile or cuneate and short-petioled, thin and pale, undulately denticulate; flowers few; petals 5–8 mm. long; capsules 4–6 cm. long, their pedicels slender, about half as long; seeds 0.3–1 mm. long, finely papillate.

Bogs and wet meadows, Arid Transition and Canadian Zones; British Columbia to eastern Oregon and Montana. Type locality: Union County, Oregon. July–Aug.

15. *Epilobium leptocarpum* Hausskn. Slender-fruited Willow-herb. Fig. 3373.

Epilobium leptocarpum Hausskn. Mon. Epilob. 258. pl. 14, fig. 67. 1884.

Perennial, apparently with small turions; stems slender, much branched, reddish, 1 dm. or less tall, glabrous except for some incurved pubescence. Leaves 1–2 cm. long, broadly lanceolate, obtuse, remotely few-toothed, with short-winged petioles; flowers abundant for the size of the plant; petals 3 mm. long, white to pinkish; capsules 2–3 cm. long, on slender pedicels 1–2 cm. long; seeds 0.75–1 mm. long, ellipsoidal, shortly hyaline-beaked, and with brownish coma.

Apparently rare, Boreal Zones; Cascade Mountains, Oregon. Type locality: Oregon. July–Aug.

Epilobium leptocarpum var. *Macounii* Trel., Rep. Mo. Bot. Gard. 2: 103. 1891. (*Epilobium paddoense* Lévl. Rep. Nov. Spec. 5: 8. 1908.) Less branched; pubescence of stem more definitely in lines and extending to flowers and capsules. Leaves ovate-lanceolate; seeds 1 mm. long. Rock crevices in Boreal Zones; Alaska to Washington (Olympic Mountains, Mount Adams, and Pend Oreille County), and Idaho. Type locality: Lake Athabasca.

Epilobium mirabile Trel. in Piper, Contr. U.S. Nat. Herb. 11: 404. 1906. Uncertainly distinct from *E. leptocarpum*, from which it differs by having seeds almost 2 mm. long. Olympic Mountains, Washington, the type locality.

16. *Epilobium oregonense* Hausskn. Oregon Willow-herb. Fig. 3374.

Epilobium oregonense Hausskn. Mon. Epilob. 276. 1884.

Epilobium oregonense var. *gracillimum* Trel., Rep. Mo. Bot. Gard. 2: 109. 1891.

Perennial, stoloniferous; stems simple, slender, erect, 1–3 dm. high, glabrous except for some sparse glandular pubescence in inflorescence, often purplish above. Leaves somewhat crowded on lower portion of stem, reduced and remote above, glabrous, oblong-linear to -ovate, entire to remotely denticulate, suberect, obtuse, sessile, 1–2.5 cm. long; flowers 1 to few; fruiting pedicels 1–3.5 cm. long; sepals often purplish, 1–2 mm. long; petals cream-colored to purplish, 4–7 mm. long, deeply emarginate; capsules erect, 2–5 cm. long, slender, often purplish; seeds smooth, blunt, scarcely 1 mm. long, with white coma.

Boggy places, upper Transition and Hudsonian Zones; in the mountains from British Columbia to southern California, Idaho, and Nevada. Type locality: Oregon. July–Aug.

17. *Epilobium glaberrimum* Barbey. Glaucous Willow-herb. Fig. 3375.

Epilobium glaberrimum Barbey, Bot. Calif. 1: 220. 1876.

Epilobium pruinosum Hausskn. Mon. Epilob. 252. pl. 15. 1884.

Epilobium fastigiatum subsp. *glaberrimum* Piper, Contr. U.S. Nat. Herb. 11: 404. 1906.

Perennial, with several stems from branching scaly rootstocks; stems simple or nearly so, slender, erect from somewhat decumbent base, glabrous and glaucous, sometimes slightly glandular-puberulent above, often purplish, 3–6 dm. tall. Leaves pallid, glabrous, glaucous, ascending, oblong-lanceolate, obtuse, entire or minutely denticulate, sessile, 2–5 cm. long, gradually reduced up the stem; flowers erect or somewhat drooping; fruiting pedicels 1–2 cm. long; sepals 1–2 mm. long; petals 4–7 mm. long, purplish to almost white; capsule 4–7 cm. long, slender, suberect; seeds papillate, about 1 mm. long, not beaked, with whitish coma.

Stream banks and wet places, upper Transition and Hudsonian Zones; Washington to southern California, Idaho, and Nevada. Type locality: Yosemite Valley, California. July–Aug.

Epilobium glaberrimum var. *fastigiatum* (Nutt.) Trelease, Rep. Mo. Bot. Gard. 2: 105. pl. 39. 1891. (*Epilobium affine* var. *fastigiatum* Nutt. in Torr. & Gray, Fl. N. Amer. 1: 489. 1840; *E. glaberrimum* var. *latifolium* Barbey, Bot. Calif. 1: 220. 1876; *E. atrichum* Levl. Rep. Nov. Spec. 7: 99. 1909; *E. platyphyllum* Rydb. Bull. Torrey Club 40: 63. 1913.) Lower, 1–3 dm. tall. Leaves broader, shorter, ovate, 1.5–2.5 cm. long, more crowded. In similar situations to the species, from British Columbia to central California and Utah. Type locality: "Plains of the Oregon."

Epilobium oreganum Greene, Pittonia 1: 225. 1888. (*Epilobium subcaesium* Greene, Pittonia 2: 295. 1892.) An uncertain species of which more material is needed to decide whether or not it is only a large-flowered form of *E. glaberrimum*, from which it differs chiefly in having larger flowers with purplish petals 8–12 mm. long. Springy places, Grants Pass, Oregon, the type locality.

18. *Epilobium alpinum* L. Alpine Willow-herb. Fig. 3376.

Epilobium alpinum L. Sp. Pl. 348. 1753.

Epilobium anagallidifolium Lam. Dict. 2: 376. 1786.

Densely caespitose perennial, stoloniferous; stems numerous, simple, erect, slender, sigmoidally bent, nodding at apex, about 1 dm. tall, glabrous, or with pubescent lines, often purplish above. Leaves rather uniformly distributed, divergent, oblong-ovate to lanceolate, obtuse, entire, or nearly so, 1–2 cm. long, on short petioles; inflorescence nodding in bud, purplish, 1- to few-flowered, somewhat crisp-pubescent or even glandular; fruiting pedicels 5–15 mm. long; sepals 2 mm. long; petals lilac to purple, 4–5 mm. long; capsule slender, linear, about 1 mm. thick, purplish, 2–4 cm. long; seeds smooth, obovoid, broad, 1 mm. long, with dingy coma.

Moist rockslides and stony places, Arctic-Alpine Zone; occasional, Alaska to central California, Colorado, and Labrador, Eurasia. Type locality: Europe. July–Sept.

19. *Epilobium clavatum* Trelease. Clavate-fruited Willow-herb. Fig. 3377.

Epilobium clavatum Trelease, Rep. Mo. Bot. Gard. 2: 111. pl. 48. 1891.

Habit much as in preceding species; stems 5–15 cm. tall, purplish, subglabrous to glandular-pubescent. Leaves broadly ovate, obtuse, divergent, 1–2 cm. long, subentire to remotely denticulate, on short petioles; flowers few, erect in bud; fruiting pedicels 1–2 cm. long; sepals 3–4 mm. long; petals purplish to rose-colored, 5–6 mm. long; capsule purplish, subclavate, 2–2.5 cm. long, stout, 1.5–2 mm. thick, frequently arcuate; seeds fusiform, papillose, 1.5–2 mm. long, with dingy coma.

Talus and slides, Arctic-Alpine Zone; British Columbia to Oregon, Montana, Utah, and Colorado. Intergrading with the preceding species and the two following ones. Type locality: Kicking Horse River, British Columbia. July–Aug.

20. *Epilobium Hornemannii* Reichb. Hornemann's Willow-herb. Fig. 3378.

Epilobium Hornemannii Reichb. Ic. Bot. Crit. 2: 73. 1824.

Perennial, with subterranean scaly branches; stems slender, erect except at very base, simple, 1–3 dm. tall, glabrous except for the crisp pubescence on the decurrent lines, slightly glandular above. Leaves ovate to elliptic-ovate, 1.5–4 cm. long, mostly obtuse, subentire or remotely serrulate, on short petioles; flowers few, erect; fruiting pedicels 1–2 cm. long; sepals 3–4 mm. long; petals purplish or violet, 5–8 mm. long; capsules erect, linear, slender, less than 1 mm. thick, 4–5 cm. long; seeds usually papillose, 1 mm. long, with dingy coma.

Damp banks and meadows, Hudsonian Zone; Alaska to central California, Greenland, New Hampshire, Colorado; also Eurasia. Type locality: Norway. July–Aug.

Epilobium Treleaseianum Levl. Rep. Nov. Spec. 5: 8. 1908. Like *E. Hornemannii*, but larger throughout, with stems 2–4 dm. tall. Leaves ovate, acutish, serrulate, 3–5.5 cm. long; sepals 5–6 mm. long; petals 10–12 mm. long; seeds papillose. Damp places, Hudsonian Zone, Washington (Mount Rainier, Mount Adams, Stevens Pass). Not certainly distinct from *E. Hornemannii*. Type locality: Selkirk Range, British Columbia.

21. *Epilobium lactiflorum* Hausskn. White-flowered Willow-herb. Fig. 3379.

Epilobium lactiflorum Hausskn. Oest. Bot. Zeitschr. 29: 89. 1879.

Epilobium alpinum of American authors, not L.

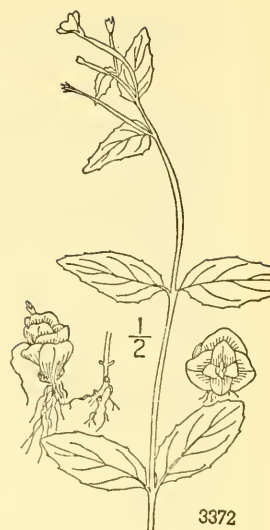
Size and habit of the preceding species, but more glabrous on decurrent lines as well as in the inflorescence. Leaves delicate, pale green, subentire or obscurely denticulate, elliptic or ob-



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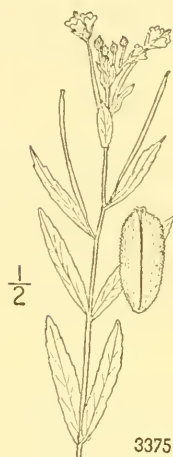
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3370. *Epilobium brevistylum*
 3371. *Epilobium Halleanum*
 3372. *Epilobium delicatum*
 3373. *Epilobium leptocarpum*

3374. *Epilobium oregonense*
 3375. *Epilobium glaberrimum*
 3376. *Epilobium alpinum*

3377. *Epilobium clavatum*
 3378. *Epilobium Hornemannii*
 3379. *Epilobium lactiflorum*

long-ovate, obtuse, 2–5 cm. long; flowers few; petals 3 mm. long, white or rose-tipped; capsules slender, erect, linear, less than 1 mm. thick 4–5 cm. long; seeds smooth, about 1 mm. long, attenuated to a beak, with dingy coma.

Moist slopes and banks, Canadian Zone to Arctic-Alpine Zone; Alaska to southern California, Colorado, and New Hampshire; also Eurasia. Type locality: Old World. July–Aug.

22. *Epilobium adenocaulon* Hausskn. Northern Willow-herb. Fig. 3380.

Epilobium adenocaulon Hausskn. Oest. Bot. Zeitschr. 29: 119. 1879.

Epilobium concinnum Congdon, Erythra 7: 184. 1900.

Epilobium glandulosum var. *adenocaulon* Fernald, Rhodora 20: 35. 1918.

Perennial, stem erect, 3–10 dm. tall, glabrous below, glandular-pubescent (and with few or no incurved hairs) in inflorescence, simple or weakly branched below, freely branched above, innovations by rosettes. Leaves glabrate to glabrous, ovate- to elliptic-lanceolate, 3–6 cm. long, obtuse to acute, serrulate, rounded into very short, winged petioles, upper leaves gradually reduced and somewhat pubescent; sepals 2 mm. long; petals white or pale or even reddish, 4 mm. long; fruiting pedicels 3–8 mm. long; capsule slender, usually reddish, 4–6 cm. long, glabrate in age; seeds obovoid, 1 mm. long, abruptly short-beaked, with whitish coma.

Moist places, mainly in Transition Zone; British Columbia to southern California and Atlantic States. Type locality: Ohio. July–Aug.

Epilobium adenocaulon var. *occidentale* Trelease, Rep. Mo. Bot. Gard. 2: 95, pl. 23. 1891. (*Epilobium occidentale* Rydb. Mem. N.Y. Bot. Gard. 1: 275. 1900; *E. glandulosum* var. *occidentale* Fernald, Rhodora 20: 35. 1918; *E. californicum* var. *occidentale* Jepson, Man. Fl. Pl. Calif. 670. 1925.) Leaves narrowly lanceolate, narrower than in the species; flowers purple or rose, the petals 5–6 mm. long. Wet places, Transition Zone; British Columbia to central California and Utah. Type locality: not given.

Epilobium adenocaulon var. *perplexans* Trelease, op. cit. 96. (*Epilobium perplexans* Trelease ex Coult. & Nels. Man. Bot. Rocky Mts. 337. 1909; *E. glandulosum* var. *perplexans* Fernald, Rhodora 20: 35. 1915; *E. praecox* Suksd. Werwenda 1: 27. 1927; *E. griseum* Suksd. op. cit. 28.) Usually less than 3 dm. tall, not so glandular, slender and rather simple. Leaves thin, tapering at base to slender petioles; flowers whitish; petals 4 mm. long. Moist places, Transition Zone; eastern Washington to eastern California and Rocky Mountains. Type locality: not given.

23. *Epilobium californicum* Hausskn. California Willow-herb. Fig. 3381.

Epilobium californicum Hausskn. Mon. Epilob. 260. 1884.

Epilobium Parishii Trelease, Zoe 1: 210. 1890.

Epilobium Palmeri Lévl. Rep. Nov. Spec. 5: 98. 1908.

Epilobium cinerascens Piper, Proc. Biol. Soc. Wash. 30: 75. 1917.

Epilobium californicum var. *Parishii* Jepson, Man. Fl. Pl. Calif. 670. 1925.

Annual or perennial, erect, 3–10 dm. tall, branched freely, not at all glandular in the inflorescence, having a whitish more or less appressed pubescence about the flowers and young capsules. Leaves lanceolate to lance-ovate, 3–7 cm. long, serrulate, short-petioled; sepals 2 mm. long; petals white or pink, 2–4 mm. long; capsules slender, 4–6 cm. long; seeds as in the preceding species.

Moist places in valleys and lower canyons, Upper Sonoran and Transition Zones; western Washington to California, west of the Sierra Nevada. Intergrading freely with *E. adenocaulon* and the following variety. Type locality: "Colonia Ross," Sonoma County, California. June–Sept.

Epilobium californicum var. *holosericeum* (Trelease) Jepson, Man. Fl. Pl. Calif. 670. 1925. (*Epilobium holosericeum* Trelease, Rep. Mo. Bot. Gard. 2: 91, pl. 17. 1891.) With habit of the species, but canescent throughout with soft subappressed hairs; petals 4–5 mm. long, pink to purple. Moist places, valleys of California west of the Sierra Nevada and south to the border. Type locality: San Bernardino County, California.

24. *Epilobium franciscanum* Barbey. San Francisco Willow-herb. Fig. 3382.

Epilobium franciscanum Barbey, Bot. Calif. 1: 220. 1876.

Epilobium Congdonii Lévl. Rep. Nov. Spec. 5: 98. 1908.

Epilobium Watsonii var. *franciscanum* Jepson, Man. Fl. Pl. Calif. 670. 1925.

Perennial, rosuliferous, with rather coarse reddish stems, 3–10 dm. tall, glabrate below, subcanescent to subpilose and sometimes glandular above, with numerous usually crowded branches above. Leaves numerous, prevailingly opposite, elliptic-lanceolate to ovate-lanceolate, obtuse, serrate, glabrate to pubescent, 3–6 cm. long, generally rounded at base into very short broad petioles; flowers at first crowded, scarcely exceeding the somewhat reduced upper leaves; fruiting pedicels commonly 5–10 mm. long; sepals 4–5 mm. long, reddish; petals usually red-purple, 6–10 mm. long, deeply emarginate; capsule slender, 5–8 mm. long, pubescent; seeds 1 mm. long, half as wide, with whitish coma.

Wet places, Upper Sonoran and Transition Zones; Lower Columbia River to central coastal California. Type locality: near San Francisco, California. May–July.

Epilobium Watsonii Barbey, Bot. Calif. 1: 219. 1876. Not certainly distinct from the preceding species; more pubescent, leaves less dentate. Coast of Sonoma County, California. Type locality: Fort Ross.

5. BOISDUVALIA Spach, Hist. Veg. 4: 383. 1835.

Caulescent, mostly erect annuals. Leaves alternate, simple, sessile. Flowers small, or minute, in leafy spikes, or axillary to foliage leaves. Hypanthium produced above the ovary, short, funnelform; sepals 4, erect. Petals 4, sessile, obovate, 2-lobed, purple to white. Stamens 8, those opposite the petals shorter; anthers basifixed, all perfect; pollen

in tetrads. Stigma with 4 cuneate lobes. Capsule 4-celled, 4-valved, sessile. Seeds smooth, without a coma. [Named for Jean Alphonse Boissduval, French naturalist and physician.]

Genus of 10 species of the western United States and adjacent Canada and of Chile, Argentina, and Tasmania. Type species, *Oenothera concinna* D. Don.

Capsule septifragal, the septa wholly adherent to the placental axis, making the latter 4-winged; leaves lanceolate, toothed, the upper broader.

Capsule subterete and loculicidal, the septa adherent to the valves in dehiscence, or capsule 4-sided and not dehiscent.

Capsule coriaceous, 4-sided, tardily if at all dehiscent; leaves narrowly lanceolate; ovules rather numerous, 10–14 in each row.

Capsule membranous, terete, usually dehiscent; ovules fewer, except sometimes in *B. glabella*.

Hypanthium 0.5–1 mm. long; petals 1.5–4 mm. long.

Floral leaves ovate or oblong, broader than the foliage leaves; petals 2–4 mm. long; capsule 6–8 mm. long, quite straight.

Floral leaves linear; petals 1–2 mm. long; capsule 8–10 mm. long, usually curved.

Hypanthium 2–3 mm. long; petals 5–10 mm. long.

Leaves serrulate, crowded; petals 7–10 mm. long; capsule straight.

Leaves quite entire, not crowded; petals 5–8 mm. long; capsule curved.

1. *Boissduvalia densiflora* (Lindl.) S. Wats. Dense-flowered Boissduvalia.

Fig. 3383.

Oenothera densiflora Lindl. Bot. Reg. 19: pl. 1593. 1833.

Boissduvalia Douglasii Spach, Hist. Veg. 4: 385. 1835.

Boissduvalia densiflora S. Wats. Bot. Calif. 1: 233. 1876.

Boissduvalia densiflora var. *imbricata* Greene, Fl. Fran. 225. 1891.

Boissduvalia bipartita Greene, Erythea 3: 119. 1895.

Boissduvalia densiflora var. *montana* Jepson, Fl. W. Mid. Calif. 330. 1901.

Simple or branched, particularly above, usually 3–10 dm. tall, commonly villous, green to canescent, leafy throughout. Lower leaves lanceolate to lance-linear, acute, entire or denticulate, 2–5 cm. long, the floral ones ovate, acute, 5–12 mm. long, sometimes densely imbricated and concealing the capsules; inflorescence dense, long-spicate in fruit; sepals 2–4 mm. long, lanceolate; petals rose-purple, sometimes whitish, bilobed, 6–12 mm. long; capsule stout, straight, 8–10 mm. long, septifragal, the septa adhering to the placenta which thus becomes 4-angled; seeds few, ovoid, angled, brown, paler at ends, concave on inner face, 1.5 mm. long.

In places moist in the early season, Upper Sonoran and Transition Zones; British Columbia to southern California, Idaho, and Nevada. Type locality: "Northern California." May–Aug. An exceedingly variable species.

Boissduvalia densiflora var. *palléscens* Suksd. Deutsch. Bot. Monatss. 18: 88. 1900. Pubescence spreading, usually with some gland-tipped hairs; floral bracts often remote, broadly ovate gradually acuminate; flowers pale; seeds 3–4 in each cell, 2 mm. long. Intergrading with the typical species and variety *salicina*. Klickitat County, Washington, south to Placer County, California. Type locality: near Bingen, Klickitat County, Washington.

Boissduvalia densiflora var. *salicina* (Nutt.) Munz, Leaflets West. Bot. 3: 53. 1941. (*Oenothera salicina* Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 505. 1840; *Boissduvalia sparsiflora* Heller, Muhlenbergia 1: 42. 1904.) Pubescence short strigose-canescens, the hairs not gland-tipped; petals pale, mostly 2.5–5 mm. long. Eastern Washington and Idaho south to Nevada County, California, and western Nevada. Type locality: "On the Wahlamet and Wallawallah," Oregon.

2. *Boissduvalia cleistogama* Curran. Cleistogamous Boissduvalia. Fig. 3384.

Boissduvalia cleistogama Curran, Bull. Calif. Acad. 1: 12. 1884.

Erect and simple, or more usually branched from the base, 1–2 dm. tall, more or less villous and glandular throughout, densely leafy. Leaves linear to lanceolate, 2–3 cm. long, 1.5–5 mm. wide, acute, remotely denticulate, pale, not much reduced up the stem; flowers axillary along the branches, the earliest cleistogamous, the latter rose-colored; sepals 1–2 mm. long; petals bifid, 3 mm. long; capsule hard, coriaceous, 4-sided, sharply angled, and with 4 nerves, pointed, slightly curved, 1 cm. long, 1.5 mm. thick, tardily if at all dehiscent; seeds light brown, linear, angled, 1–1.5 mm. long.

Dried beds of vernal pools, Upper Sonoran Zone; Great Valley of California. Type locality: Elmira, Solano County, California. May–June.

3. *Boissduvalia glabella* (Nutt.) Walp. Smooth Boissduvalia. Fig. 3385.

Oenothera glabella Nutt. in Torr. & Gray, Fl. N. Amer. 1: 505. 1840.

Boissduvalia glabella Walp. Rep. 2: 89. 1843.

Simple or more frequently freely and decumbently branched from base, 10–30 cm. tall, glabrate or pubescent on veins, or throughout, the stems uniformly leafy. Leaves sessile, lance-ovate to -oblong, acute, serrulate, bright green, 1–1.5 cm. long; flowers axillary, sometimes even in lowest axils; sepals 2 mm. long; petals purplish, 2–4 mm. long; capsule 6–8 mm. long, straight, pointed at tip; seeds numerous, grayish brown, narrowly subfusiform, angled, 1 mm. long.

Dry mud flats and vernal pools, Upper Sonoran Zone; at scattered stations from British Columbia to southern California, Saskatchewan, and Nevada, and also Argentina. Type locality: "Plains of the Oregon east of Wallawallah." June–Aug.

Boissduvalia glabella var. *campestris* Jepson, Fl. W. Mid. Calif. ed. 2. 276. 1911. (*Boissduvalia campestris* Jepson, Fl. W. Mid. Calif. 330. 1901.) Leaves of the upper branches ovate to oblong-ovate, densely overlapping and concealing the capsules. Modoc County and Glenn and Butte Counties south to Monterey and Merced Counties, California. Type locality: Little Oak, Vacaville, Solano County.

4. *Boisduvalia macrantha* Heller. Large-flowered Boisduvalia. Fig. 3386.

Boisduvalia macrantha Heller, Muhlenbergia 2: 101. 1905.

Stems 1–10 dm. tall, simple or few-branched at the base or above, glabrous near the base, villous above. Leaves rather crowded, 2–4 cm. long, 5–9 mm. wide, lanceolate to oblanceolate the upper almost ovate, acute to acuminate, remotely serrulate, sessile; flowers solitary in the upper axils; hypanthium villous, 2.5–3 mm. long; sepals narrowly lanceolate, villous, 3–6 mm. long; petals rose-purple when dry, divided about one-half their length, the lobes asymmetrically rounded at the tips, 7–10 mm. long; capsule straight lance-linear, 1–2 cm. long, 2 mm. thick near base, with slender apical beak 2–3 mm. long; seeds 5–6 in each row, brownish, somewhat shining, 2 mm. long, microscopically cellular-punctate.

Gravel washes and fields, Upper Sonoran and Transition Zones; Modoc and Shasta Counties to Butte County, California. Type locality: near Redding, Shasta County. May–July.

5. *Boisduvalia stricta* (A. Gray) Greene. Narrow-leaved Boisduvalia. Fig. 3387.

Gayophytum strictum A. Gray, Proc. Amer. Acad. 7: 340. 1867.

Boisduvalia Torreyi S. Wats. Bot. Calif. 1: 233. 1876.

Boisduvalia stricta Greene, Fl. Fran. 225. 1891.

Boisduvalia diffusa Greene, Proc. Acad. Phila. 1895: 547. 1896.

Boisduvalia parviflora Heller, Bull. Torrey Club 25: 199. 1898.

Stems 1–4.5 dm. tall, simple or with few to several erect, virgate branches from near base, pilose and quite canescent throughout. Leaves linear to lanceolate, 1–4 cm. long, 2–3 (4) mm. wide, acute, entire to sharply denticulate, nearly or quite sessile, the upper ones narrower than the lower ones; flowers axillary, often beginning near the base of the plant; sepals 1 mm. long; petals rose-purple or violet, 1.5–2 mm. long; capsule 8–10 mm. long, membranous, slender, usually curved outwards and attenuate, tardily loculicidal; seeds ovoid, brown, 1 mm. long, 6 to 8 in each cell.

Moist spots, Upper Sonoran Zone; eastern Washington and Idaho south to Nevada and to Tulare County, California. Type locality: Cloverdale, Sonoma County, California. May–July.

6. *Boisduvalia pallida* Eastw. Pale Boisduvalia. Fig. 3388.

Boisduvalia pallida Eastw. Leaflets West. Bot. 2: 54. 1937.

Stems 1–4 dm. tall, slender, mostly branched from the base, sometimes simple, tomentulose and pilose, glabrescent below in age. Leaves not crowded, somewhat reduced above, 1.5–5 cm. long, 3–6 mm. wide, lanceolate, acute to acuminate, subentire, subsessile, strigose to subglabrous; flowers axillary, even in lowermost axils; hypanthium soft-pubescent, 2–3 mm. long; sepals 3–4 mm. long, pubescent; petals reddish, 5–8 mm. long; capsule 1.5–3 cm. long, 1.5–2 mm. thick at base, tapering gradually into a slender outcurved beak 2–4 mm. long; seeds about 6 in each cell, brownish, 1.5–2 mm. long, cellular-pitted.

Moist places, Upper Sonoran and Transition Zones; Josephine and Jackson Counties, Oregon, and Modoc County, California, south to Tehama and Plumas Counties, California. Type locality: Goose Valley, Shasta County. June–July.

6. *CLÁRKIA* Pursh, Fl. Amer. Sept. 1: 260. *pl.* 11. 1814.

Annual herbs, simple or branched above, with spicate inflorescence and nodding or reflexed buds. Hypanthium short or greatly elongated; sepals distinct or united in anthesis. Petals distinctly unguiculate, claws at least one-sixth as long as blades; blades simple or lobed, pink to lavender or purplish. Stamens 4 and alternate with the petals, or 8, with the epipetalous ones shorter and sometimes not functional; anthers linear, fixed near the base. Stigma 4-lobed, the lobes lance-linear to suborbicular. Capsule linear or attenuate above, 4-celled, usually 4-angled (at least when dried). Seeds in one row in each cell, cellular-pubescent and with the creasing reduced, or not pubescent but with minute transverse corrugations and conspicuous creasing. [Named for Captain William Clark, of the Lewis and Clark expedition to the Northwest in 1806.]

A genus of 7 species, confined to western North America. Type species, *Clarkia pulchella* Pursh.

Blade of petal not lobed, although occasionally with small teeth on the claws; stamens 8; anthers glabrate; seeds cellular-pubescent, scarcely crested. (Subgenus *Phacostoma*)

Hypanthium with band of hairs within or with scales at summit; anthers not curling after dehiscence; blade of petal 2–4 times the length of the rather broad claw.

Sepals united in anthesis; no scales on filaments, but band of hairs within the hypanthium; capsule nearly sessile; petals pinkish.

Sepals distinct in anthesis; scales present at base of filaments; capsule pedicelled; petals purplish.

Hypanthium without band of hairs or scales within; anthers curling slightly after dehiscence; petal about as long as the narrow claw.

Blade of petal lobed; anthers usually ciliate-villous.

Hypanthium 2–4 mm. long; stamens 8; seeds cellular-pubescent, minutely crested. (Subgenus *Euclarkia*)

Petals bilobed with subulate tooth at base of sinus; short stamens functional; hypanthium with ring of hairs within.

Petals 3-lobed, lobes about equal; shorter stamens not functional; hypanthium without ring of hairs within.

1. *C. delicata*.

2. *C. rhomboidea*.

3. *C. elegans*.

4. *C. xantiana*.

5. *C. pulchella*.



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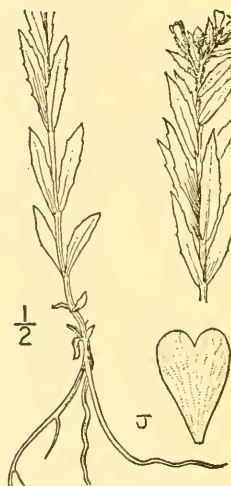
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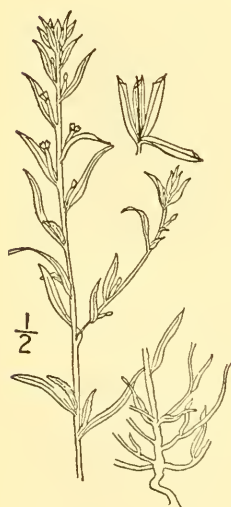
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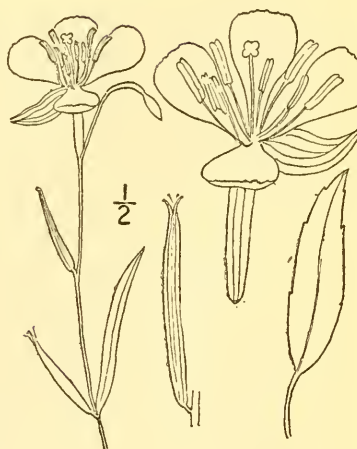
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3380. *Epilobium adenocaulon*
 3381. *Epilobium californicum*
 3382. *Epilobium franciscanum*
 3383. *Boisduvalia densiflora*

3384. *Boisduvalia cleistogama*
 3385. *Boisduvalia glabella*
 3386. *Boisduvalia macrantha*

3387. *Boisduvalia stricta*
 3388. *Boisduvalia pallida*
 3389. *Clarkia delicata*

Hypanthium 15–30 mm. long; stamens 4; seeds not cellular-pubescent but transversely corrugated, and with conspicuous crestring. (Subgenus *Eucharidium*)

Filaments club-shaped toward tips; anthers not coiling after dehiscence; middle lobe of petal much narrower than lateral ones; stigma-lobes lance-linear, 3 mm. long. 6. *C. Breweri*.

Filaments flattened but not club-shaped; anthers coiling after dehiscence; middle lobe of petals at least as wide as lateral ones; stigma-lobes rounded, 1 mm. long. 7. *C. concinna*.

1. *Clarkia delicata* (Abrams) Nels. & Macbr. Delicate *Clarkia*. Fig. 3389.

Godetia delicata Abrams, Bull. Torrey Club 32: 539. 1905.

Clarkia delicata Nels. & Macbr. Bot. Gaz. 65: 60. 1918.

Simple to sparingly branched from the middle, with stems 3–5 dm. tall, nearly glabrous. Leaf-blades narrowly to broadly lanceolate, remotely to rather sharply denticulate, 2–5 cm. long, acute or nearly so, with slender petioles 5–15 mm. long; flowers in long loose spike; inflorescence strigillose; buds nodding, obovoid; hypanthium 1–3 mm. long with band of hairs on upper half of inner surface; sepals united in anthesis, green or reddish; petals spatulate, 1–1.5 cm. long, the blade rose-pink and 2–3 times as long as the slender whitish claw; stamens 8, in two unequal sets, the longer ones about half the length of petals; stigma-lobes rounded, 1–1.5 mm. long; capsule 1.5–2.5 cm. long, subsessile, slightly beaked; seeds brown, cellular-pubescent, oblique-prismatic, not crested.

Dry slopes in the chaparral, Upper Sonoran Zone; eastern San Diego County, California. Type locality: between Campo and Potrero. May.

2. *Clarkia rhomboidea* Dougl. Rhomboid *Clarkia*. Fig. 3390.

Clarkia rhomboidea Dougl. in Hook. Fl. Bor. Amer. 1: 214. 1834.

Phacostoma Douglasii Spach, Ann. Mus. Paris II. 4: 395. 1835.

Clarkia gauroides Dougl. ex Sweet, Brit. Flow. Gard. II. 4: pl. 379. 1838.

Clarkia virgata Greene, Erythea 3: 123. 1895.

Godetia latifolia Nels. & Kenn. Proc. Biol. Soc. Wash. 19: 156. 1906.

Simple or few-branched, 2–11 dm. tall, finely pubescent. Leaves few, subopposite, lance-ovate to ovate-oblong or elliptic, the blades 2–7 cm. long, acute, entire or remotely denticulate, glabrate to finely pubescent; petioles 1–3 cm. long; flowers in elongated spikes, buds nodding; hypanthium 1–3 mm. long, with scales and white hairs at summit; sepals green, usually distinct in anthesis; petals 5–10 mm. long, rose-purple, sometimes dotted, rhomboidal, with the blade 2–4 times as long as the claw; stamens unequal, each with a scale at the base; stigma-lobes rounded, 0.5 mm. long; capsules 1–3 cm. long, 2–4 mm. thick, 4-angled when dry, on pedicels 1–4 mm. long; seeds brown, densely cellular-pubescent, 1 mm. long, with a thickened ridge at summit, and almost no crestring.

Fairly dry slopes, Upper Sonoran and Transition Zones; Washington to northern Lower California and Arizona. Type locality: "From the Great Falls of the Columbia to the Rocky Mountains." Collected by Douglas. May–July.

3. *Clarkia elegans* Dougl. Elegant *Clarkia*. Fig. 3391.

Clarkia elegans Dougl. in Lindl. Bot. Reg. 19: pl. 1575. 1833.

Clarkia unguiculata Lindl. Bot. Reg. 23: pl. 1981. 1837.

Gauropsis lancifolia Presl, Epimel. Bot. 219. 1849.

Clarkia Eiseniana Kell. Proc. Calif. Acad. 7: 94. 1877.

Simple or branched, 2–8 dm. tall, the stems glabrous, glaucous. Leaves lanceolate to lance-ovate, 2–5 cm. long, acute, remotely denticulate, glabrous, sometimes glaucous, sessile or with winged petioles, 2–7 mm. long; inflorescence pubescent to glandular and pilose, loose; hypanthium 2–4 mm. long, with a ring of hairs within about half way from the base, and with hairs about the base of the stamens; sepals united in anthesis; petals rose to purple, 1–2 cm. long, the blade deltoid-rhomboidal, about as long as the narrow claw; stamens unequal, 8, the longer alternate ones about as long as claws; stigma-lobes short, rounded, 1–1.5 mm. long; capsule 1–2.5 cm. long, about 2 mm. thick, sessile, beakless, usually glandular and pilose, curved to straight; seeds brown, 1 mm. long, cellular-pubescent, angled, with very inconspicuous crestring.

Dry slopes in chaparral and similar places, Upper Sonoran Zone; Mendocino County and Sierra Nevada foothills to southern California. Type locality: California. May–June.

4. *Clarkia Xanthiana* A. Gray. Xantus' *Clarkia*. Fig. 3392.

Clarkia Xanthiana A. Gray, Proc. Bost. Soc. Nat. Hist. 7: 145. 1859–1861.

Clarkia parviflora Eastw. Bull. Torrey Club 30: 492. 1903.

Phacostoma Xanthiana A. Nels. Bot. Gaz. 52: 267. 1911.

Simple or sparingly branched from near the middle, 2–7 dm. tall, glaucous especially below, strigillose above. Leaves lanceolate, acute, entire to denticulate, sessile or with short petiole, finely pubescent to glabrate; inflorescence a long loose, grayish strigillose spike; hypanthium 2–4 mm. long, with a broad band of hair within; sepals 7–15 mm. long, grayish green, usually united in anthesis; corolla irregular, the two lower petals turned aside; petals lavender to rose, often with large spot of crimson or purple at base of blade, cuneate, bilobed, with small tooth at base of V-shaped sinus, the blade 7–11 mm. long, the claw 3–4 mm.; stamens unequal, the longer about equaling the petals; stigma-lobes short, rounded; young ovaries deflexed; capsules erect,

straight or curved, 4-angled, 1.5–3 cm. long, sessile or nearly so; seeds brown, obliquely cylindric, 1.5 mm. long.

Dry slopes, Upper Sonoran Zone; Kern County and Los Angeles County, California, especially in the mountains bordering the western edge of the Mojave Desert. Type locality: Fort Tejon, Kern County. May–June.

5. *Clarkia pulchella* Pursh. Beautiful *Clarkia*. Fig. 3393.

Clarkia pulchella Pursh, Fl. Amer. Sept. 1: 260. pl. 11. 1814.

Simple to diffusely branched, 1–5 dm. tall, finely pubescent to strigillose, very leafy. Leaves linear-lanceolate to spatulate, sessile or with petiole up to 1 cm. long; the blades entire or remotely denticulate, 2–7 cm. long, acuminate to acute, upper leaves not much reduced; flowers in a short crowded spike which elongates in fruit; buds nodding; hypanthium 2–3 mm. long, lavender, without inner hairs; sepals usually united in anthesis, lavender, 1–1.5 cm. long; petals lavender to purple, with lighter veins, 1.5–3 cm. long, 3-lobed, the lobes 6–10 mm. long, about equal in length, the middle one usually wider than lateral ones, claw quite narrow, one-half to one-third as long as blade, with a divaricate tooth on each side; stamens in 2 sets, the longer ones 3–8 mm. long, with erect scale at base; anthers coiling after dehiscence; stigma-lobes rounded, 1–3 mm. long; capsule 1–2.5 cm. long, straight or arcuate, 8-ribbed, grooved on each face, appearing square when dry, with pedicel 3–10 mm. long; seeds brown, depressed, oblique, not angled, 1 mm. long.

Dry slopes, Upper Sonoran and lower Transition Zones; eastern British Columbia and Washington to Montana and South Dakota. Type locality: opposite the town of Kamiah, Idaho, on the Kooskooskie River. May–July.

6. *Clarkia Brèweri* (A. Gray) Greene. Brewer's *Clarkia*. Fig. 3394.

Eucharidium Brèweri A. Gray, Proc. Amer. Acad. 6: 532. 1865.

Clarkia Brèweri Greene, Pittonia 1: 141. 1887.

Clarkia Saxcana Greene, op. cit. 140.

Simple or branched, with stems 1–2 dm. tall, finely pubescent. Leaf-blades lanceolate to oblong-lanceolate, 2–4 cm. long, acute, entire, glabrate, on petioles 5–10 mm. long; inflorescence sparsely strigillose, flowers few; hypanthium 2.5–3 cm. long, conspicuously swollen at juncture with ovary, finely pubescent within, but lacking scales or band of hair; sepals reddish or green, united in anthesis; petals rose-pink, 1.5–2.5 cm. long, obcordate, with the central lobe merely a spatulate appendage from the sinus and one-third or one-fourth as wide as the lateral lobes, the sinus 4–6 mm. deep, the claw 3–4 mm. long; corolla irregular; stamens 4, equal, alternate with the petals, anthers conspicuously ciliate-villous, not coiled after dehiscence; stigma-lobes linear, 3 mm. long; capsule 2–3.5 cm. long, 2–3 mm. thick, sessile; seeds 3 mm. long, not pubescent, but conspicuously transversely corrugated, brown, flattened, with very prominent creasing.

Occasional on dry slopes, Upper Sonoran Zone; California from Napa County to San Benito and Fresno Counties. Type locality: Mount Oso, Stanislaus County, California. May.

7. *Clarkia concinna* (Fisch. & Mey.) Greene. Lovely *Clarkia*. Fig. 3395.

Eucharidium concinnum Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 37. 1835.

Eucharidium grandiflorum Fisch. & Mey. op. cit. 7: 48. 1840.

Clarkia concinna Greene, Pittonia 1: 140. 1887.

Clarkia grandiflora Greene, Fl. Fran. 223. 1891.

Stem simple to freely branched, 1.5–4 dm. tall, glabrate below, strigillose above. Leaves lance-ovate to broadly elliptic, 1.5–5 cm. long, acute, subentire, with petioles an additional 0.5–2 cm. long; flowers axillary, often crowded; hypanthium 1.5–2.5 cm. long, slender, yellow to purple, finely pubescent within, but without scales or band of hair; sepals reddish, or green, 1–2 cm. long, united at tips in anthesis; petals 1.5–3 cm. long, 1–1.5 cm. wide, deep pink to rose-lavender, 3-lobed, the middle lobe slightly exceeding the lateral ones in length and width, blade about twice as long as claw; stamens 4, alternate with petals, anthers ciliate-villous, curled after dehiscence; stigma-lobes 1 mm. long, equally broad; capsules 1.5–2.5 cm. long, 1.5–2.5 mm. thick, sessile or on short pedicels; seeds minutely transversely corrugated, about 2 mm. long, flattened, with very prominent creasing.

Loose slopes, Upper Sonoran Zone; Coast Ranges of California from Humboldt County to Santa Barbara County. Type locality: Fort Ross, California. May–June.

7. GODÉTIA Spach, Hist. Veg. 4: 386. 1835.

Annuals, mostly erect, and with exfoliating epidermis on lower stems. Leaves linear to spatulate, lower ones usually deciduous, upper ones reduced in size, secondary ones born in fascicles. Inflorescence a spike or small panicle; the flowers showy, white to purple. Hypanthium obconic to narrowly funnelform, with an inner ring of hair; sepals distinct and reflexed in anthesis or partially or wholly united and turned to one side. Petals cuneate to obovate, entire to bilobed, clawless, or with short claw. Stamens in 2 series, the opposite ones shorter; filaments filiform to flattened; anthers subequal to equal, usually wholly fertile. Stigma-lobes short, ovoid to linear, yellow to purple. Capsule 4-sulcate, terete and 8-nerved, heavily 8-ribbed, linear to ovoid, sessile to long-pedicelled,

beakless to long-beaked. Seeds brown, sometimes somewhat cellular-puberulent, with fimbriate upper margin. [Named for C. H. Godet, 1797-1879, author of *Flora de Jura*.]

A genus of about 14 species, found in western North America and Chile. Most abundant in California. Type species, *Oenothera purpurea* Curtis.

Hypanthium with inner ring of hairs from one-fourth to three-fifths the way from the base to the summit; buds erect, except in Numbers 3, 7, 8.

Stigma-lobes less than 4 mm. long.

Capsule 8-ribbed when immature, terete or somewhat square and 8-nerved when dried.

Buds erect; sepals usually distinct, but sometimes united.

Hypanthium 2-7 mm. long, tapered uniformly from base to summit; no annular swelling at top of ovary.

Inflorescence not congested in normal plants; capsules not enlarged at center; leaves 2-8 mm. wide.

Inflorescence congested in normal plants; capsule enlarged at middle; leaves 3-18 mm. wide.

Hypanthium 5-15 mm. long, slender toward base and flaring out at summit; ovary usually with annular swelling at top.

Plants branching mainly from middle, erect; branchlets stout; capsules straight or nearly so.

Plants branching from base, somewhat ascending; branchlets filiform; capsule usually strongly arcuate.

Buds nodding; sepals united in anthesis.

Capsule rounded at base, not linear, with evident ribs in dry material; petals lavender without purple base; stigma-lobes linear; inflorescence frequently glandular-pubescent.

Capsule elongate, linear, frequently square and smooth in mature specimens; petals lavender, usually with purple base; stigma-lobes oval; inflorescence never glandular-pubescent.

Capsule 4-sulcate when immature, terete and 8-nerved when mature.

Stigma-lobes 4-7 mm. long.

Capsule not greatly enlarged at middle; petals not over 4 cm. long.

Capsule greatly enlarged at middle; petals 4-6 cm. long.

Hypanthium with inner ring of hairs at least three-fifths of way from base to summit; buds nodding.

Petals less than 1.5 cm. long, white or cream, or tinged with pink; stigma-lobes very short, less than 0.5 mm. long.

Petals 1.5 cm. or more long, lavender to purple; stigma-lobes more than 0.5 mm. long.

Capsule very narrowly linear, 2-4 cm. long, 1-2 mm. thick; petals lavender with purple base.

Capsule thicker; petals lavender, but without purple base.

Filaments unequal, slightly flattened; living capsule terete and faintly nerved, mature and dry capsule square and obscurely nerved or smooth; pedicels as much as 2 cm. long.

Filaments subequal, subfiliform; capsule 8-ribbed, these ribs especially evident in dry or mature material; pedicel usually less than 3 mm. long.

Petals not bilobed; capsule sessile or nearly so.

Petals bilobed; capsule with short pedicel.

1. *Godetia quadrivulnera* (Dougl.) Spach. Four-spotted Godetia. Fig. 3396.

Oenothera quadrivulnera Dougl. ex Lindl. Bot. Reg. 13: pl. 1119. 1828.

Godetia quadrivulnera Spach, Hist. Veg. 4: 389. 1835.

Godetia bingensis Suksd. Deutsch. Bot. Monatss. 18: 88. 1900.

Godetia Goddardii Jepson, Univ. Calif. Pub. Bot. 2: 341. 1907.

Godetia sparsifolia Jepson, loc. cit.

Usually erect, branching from base or near middle, 1-8 dm. tall. Leaf-blades lanceolate to oblong, 2-5 cm. long, acute, sessile or nearly so; buds erect; hypanthium 2-6 mm. long, with inner ring of hairs about one-third way from base; sepals green or yellow, usually distinct in anthesis, 5-10 mm. long; petals lavender to purple, with or without darker spot near center, 5-20 mm. long, cuneate; capsules 1-3.5 cm. long, 2-3 mm. thick, terete and 8-ribbed with a faint nerve between the ribs when fresh, or square and conspicuously ribbed when dry, the ribs all about equally prominent, sessile or on pedicels as much as 2 mm. long, tapering into a beak 0.5-2 mm. long; seeds 1 mm. long, equally broad, with cresting about one-fifth as long as body of seed.

Open hillsides, particularly at edge of woods, Upper Sonoran and Transition Zones; Washington to Lower California. Type locality: "north-west of North America." Collected by Douglas. April-July.

Godetia quadrivulnera var. *Davyi* Jepson, Univ. Calif. Pub. Bot. 2: 341. 1907. Leaves short, 1-2 cm. long, oblong to spatulate; capsules scarcely beaked, ribs very prominent, especially along the sutures. Near the coast from Del Norte County to Monterey County, California. Type locality: Point Reyes, Marin County.

Godetia quadrivulnera var. *vacensis* Jepson, loc. cit. Leaves lanceolate, 2-5 cm. long; sepals usually united in anthesis; capsule 2-4 cm. long, very slender, with a beak 2-4 mm. long, capsule-ribs of equal prominence. At scattered stations in California from Solano and Sacramento Counties to Ventura County. Type locality: Vaca Mountains.

2. *Godetia purpurea* (Curtis) G. Don. Purple Godetia. Fig. 3397.

Oenothera purpurea Curtis, Bot. Mag. 10: pl. 352. 1796.

Godetia Willdenowiana Spach, Hist. Veg. 4: 387. 1835.

Godetia purpurea G. Don in Sweet, Hort. Brit. ed. 3. 237. 1839.

Erect, simple or with branches closely crowded at summit, 1-6.5 dm. tall, glabrate to pubescent. Leaves broadly elliptic, 2-4 cm. long, 1-2 cm. wide, puberulent yet appearing glaucous, the



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3390. *Clarkia rhomboidea*
 3391. *Clarkia elegans*
 3392. *Clarkia xantiana*

3393. *Clarkia pulchella*
 3394. *Clarkia breweri*
 3395. *Clarkia concinna*

3396. *Godetia quadrivulnera*
 3397. *Godetia purpurea*
 3398. *Godetia amoena*

tips curving downward, short-petioled; inflorescence crowded with flowers and fruits concealed by the leaves, buds erect; hypanthium 3–7 mm. long, with inner ring of hairs about one-third way from base; sepals 4–10 mm. long, usually distinct and reflexed in anthesis; petals crimson to purple, sometimes with darker spot, not clawed, cuneate to obovate, 5–20 mm. long; stamens unequal; capsule glabrate to pubescent, 1–3 cm. long, 3–5 mm. thick, usually enlarged at middle, strongly 8-ribbed, sessile or short-pedicellate, not beaked, terete when fresh, usually square when dry; seeds 1 mm. long, slightly thicker, with minute crestring.

Not common, dry open valleys, Upper Sonoran Zone; San Francisco Bay region. Type locality: "Western Coast of North America." May–June.

Godetia purpurea var. *parviflora* (S. Wats.) C. L. Hitchcock, Bot. Gaz. 89: 335. 1930. (*Oenothera lepida* var. *parviflora* S. Wats. Proc. Amer. Acad. 8: 597. 1873; *Godetia lepida* Lindl. Bot. Reg. 22: pl. 1849. 1836; *G. albescens* Lindl. op. cit. 27: misc. 61. 1841; *G. decumbens* Spach, Hist. Veg. 4: 388. 1835; *G. micrope-tala* Greene, Pittonia 1: 32. 1887; *G. lanata* Elmer, Bot. Gaz. 41: 317. 1906; *G. purpurea* var. *Elmeri* Jepson, Univ. Calif. Pub. Bot. 2: 345. 1907; *G. purpurea* var. *procera* Jepson, op. cit. 346; *G. purpurea* var. *lacunarum* Jepson, Man. Fl. Pl. Calif. 679. 1925; *G. Goddardii* var. *capitata* Jepson, op. cit. 678.) Leaves 3–12 mm. wide, lanceolate to spatulate, pubescent, never glaucous in appearance, with tips erect; capsule pubescent to densely lanate. Dry slopes and valleys, Upper Sonoran Zone; in the cismontane region from Salem, Oregon, to southern California. Type locality: northern California.

3. *Godetia amoena* (Lehm.) G. Don. Farewell-to-spring. Fig. 3398.

Oenothera amoena Lehm. Ind. Sem. Hort. Hamb. 8. 1821.

Oenothera Lindleyi Dougl. Bot. Mag. 55: pl. 2832. 1828.

Godetia rubicunda Lindl. Bot. Reg. 22: pl. 1856. 1836.

Godetia vinosa Lindl. op. cit. pl. 1880.

Godetia amoena G. Don in Sweet, Hort. Brit. ed. 3. 237. 1839.

Godetia grandiflora Lindl. Bot. Reg. 27: misc. 61. 1841.

Godetia caurina Abrams ex Piper, Contr. U.S. Nat. Herb. 11: 410. 1906.

Godetia Blasdalei Jepson, Univ. Calif. Pub. Bot. 2: 330. 1907.

Erect, simple to diffusely branched, 1.5–10 dm. tall. Leaf blades lanceolate, 2–6 cm. long, 2–10 mm. wide, with petioles 5–15 mm. long; buds erect or slightly drooped; hypanthium 4–10 mm. long, with inner ring of hairs one-third to one-half way from base; sepals 8–25 mm. long, generally united in anthesis; petals pink to purple, often with darker spot in center, cuneate to obovate, 1.5–4 cm. long, with claw as much as 1.5 mm. long; stamens unequal to subequal; stigma-lobes linear, 2–7 mm. long, yellow; capsule 1.5–4 cm. long, 2 mm. or more thick, linear, not enlarged above center, with or without short beak, usually pedicelled, deeply 4-sulcate when immature and with a rather inconspicuous nerve between the grooves, terete and plainly nerved when mature or dry; seeds 0.5 by 1.5 mm., brown, with inconspicuous crestring.

Dry slopes at edge of coastal woods, Upper Sonoran and Transition Zones; British Columbia to Monterey, California. Type locality: "America septentrionalis." Exceedingly variable. June–Aug.

Godetia amoena var. *sonomensis* C. L. Hitchcock, Bot. Gaz. 89: 338. 1930. Petals 1.5–4 cm. long, dark lavender, usually with darker spot; stigma-lobes 3–7 mm. long, linear; capsule sessile, considerably enlarged a little above the middle. Slopes of Sonoma County, California. Type locality: near Glen Ellen, Sonoma County.

Godetia amoena var. *albicaulis* Jepson, Univ. Calif. Pub. Bot. 2: 329. 1907. (*Godetia lassenensis* Eastw. Leaflets West. Bot. 2: 281. 1940.) Petals light lavender, not spotted, 2–4 cm. long; stigma-lobes linear, 3–6 mm. long; capsule sessile or nearly so, 4–5 cm. long, 1.5–2 mm. thick, linear, with a beak 5–10 mm. long. Butte and Shasta Counties, California. Type locality: Butte County.

Godetia amoena var. *gracilis* (Piper) C. L. Hitchcock, Bot. Gaz. 89: 342. 1930. (*G. gracilis* Piper in Piper & Beattie, Fl. Northw. Coast. 251. 1915.) Capsule nearly sessile, with or without a short beak; petals 1–2 cm. long; stigma-lobes oval, 1 mm. long. Dry plains, Upper Sonoran and Transition Zones, British Columbia to Oregon. Type locality: Silvertown, Oregon.

Godetia amoena var. *concolor* Jepson, Fl. W. Mid. Calif. 334. 1901. Petals 1–1.5 cm. long; stigma-lobes oval, 1 mm. long; capsule pedicelled, with a beak 3–7 mm. long. California, Butte County to Napa and El Dorado Counties. Type locality: Pope Valley Grade, Napa County.

4. *Godetia Whitneyi* (A. Gray) T. Moore. Giant or Whitney's *Godetia*.

Fig. 3399.

Oenothera Whitneyi A. Gray, Proc. Amer. Acad. 7: 340. 1865.

Godetia Whitneyi T. Moore, Flor. & Pomol. 101. 1871.

Oenothera grandiflora S. Wats. Proc. Amer. Acad. 8: 596. 1873, in part.

Godetia grandiflora Jepson, Univ. Calif. Pub. Bot. 2: 347. 1907, in part.

Erect, stout, simple or with closely crowded branches above; stems 2–4.5 dm. tall, finely pubescent. Leaf-blades lance-ovate to ovate, 3–6 cm. long, with petioles 2–10 mm. long; buds erect; hypanthium broad at summit, 8–11 mm. long, with inner ring of hairs about one-third way from base; sepals 1.5–3 cm. long, united in anthesis; petals lavender, with dark or red splotch near base, cuneate to obovate, 4–6 cm. long, with claw 1–2 mm. long; stamens unequal; stigma-lobes linear, yellow, 6–7 mm. long; ovary densely canescent; capsule broadly fusiform, 1.5–2.5 cm. long, 5–7 mm. thick, round in cross-section with 8 prominent ribs, sessile or with pedicel as long as 3 mm.; seeds 1.5 mm. long, brown, covered with minute cellular pubescence and with fairly well-developed crestring.

Hills near the coast, Upper Sonoran Zone; Humboldt and Mendocino Counties, California. Type locality: Shelter Cove, Humboldt County. June–July.

5. *Godetia viminea* (Dougl.) Spach. Large *Godetia*. Fig. 3400.

Oenothera viminea Dougl. ex Hook. Bot. Mag. 55: pl. 2873. 1828.

Godetia viminea Spach, Hist. Veg. 4: 388. 1835.

Oenothera Arnottii Torr. & Gray, Fl. N. Amer. 1: 503. 1840.

Godetia Arnottii Walp. Rep. 2: 88. 1843.

Erect, branching from middle, or rarely from base, often simple, the stems 1.5–10 dm. tall, finely pubescent; flowering branches with flowers in compact spikes. Leaves lance-oblong to spatulate, the blades 2–5 cm. long, on short petioles; buds erect; hypanthium 6–9 mm. long, slender, with inner ring of hairs about one-third way from base; sepals 7–14 mm. long, reflexed in pairs or more commonly distinct in anthesis; petals lavender or purple, without central spot, without claw, 13–25 mm. long; stamens unequal; stigma-lobes elliptic, 1.5 mm. long; capsule 1–3 cm. long, 2–4 mm. thick, enlarged at middle, plainly 8-ribbed, sessile or with pedicel 2 mm. long, with beak about 1 mm. long; seeds less than 1 mm., smooth, with creasing inconspicuous.

Dry mostly coastal slopes, Upper Sonoran and Transition Zones; Multnomah County, Oregon, to Ventura County, California. Type locality: interior of northern California. June–Aug.

Godetia viminea var. *Congdonii* Jepson, Univ. Calif. Pub. Bot. 2: 338. 1907. (*Godetia Williamsonii* Dur. & Hilg. Pacif. R. Rep. 5: 7. 1855.) Petals yellow to lavender with purple spot in center; capsule not enlarged at middle, usually not over 2 mm. thick; flowers scattered on long flowering branches; hypanthium 8–12 mm. long. Dry slopes and fields, Upper Sonoran and lower Transition Zones; California, Shasta County to Kern County. Type locality: Hetch-Hetchy Valley, Tuolumne County.

Godetia viminea var. *incerta* Jepson, op. cit. 339. Petals crimson with deeper colored spot in center; inflorescence and capsules much as in the preceding variety. Lower Transition Zone; Yosemite Valley, and Eshome Valley, Tulare County, California. Type locality: Yosemite Valley.

6. *Godetia parviflora* (Hook. & Arn.) Jepson. Small-flowered *Godetia*. Fig. 3401.

Oenothera viminea var. *parviflora* Hook & Arn. Bot. Beechey 342. 1836–38.

Godetia parviflora Jepson, Univ. Calif. Pub. Bot. 2: 339. 1907.

Erect and simple, or more commonly branching from base and ascending, 1–4 dm. tall, branches filiform and wiry; leaf-blades linear-lanceolate to oblanceolate, 1–4 cm. long, short-petioled; buds erect; hypanthium slender to quite broad at summit, 5–15 mm. long, with inner ring of hairs one-fifth to one-third way from base; sepals 5–15 mm. long, green to rose, united in anthesis, reflexed in pairs, or all distinct; petals crimson throughout, except for possible purple spot above base, cuneate, 1–2 cm. long; stamens subequal, 1–4 mm. long, anthers usually lavender; stigma-lobes purple; capsule 1–2.5 cm. long, 8-ribbed, round in cross section, but appearing square in dried specimens, pubescent, usually arcuate, sessile, or with very short pedicel, not beaked or barely so; seeds nearly equilateral, 1 mm. long, dark brown, with minute creasing.

Upper Sonoran Zone; California, Monterey and San Luis Obispo Counties. Type locality: Monterey. June–July.

Godetia parviflora var. *lutæola* C. L. Hitchcock, Bot. Gaz. 89: 349. 1930. Petals cream with purple spot; filaments unequal, anthers lavender; stigma-lobes lavender, the style about as long as longer stamens. Upper Sonoran Zone, San Luis Obispo County, California. Type locality: between Atascadero and Morro Beach.

Godetia parviflora var. *margaritæ* (Jepson) C. L. Hitchcock, op. cit. 350. Petals red with yellow base; stamens unequal, anthers yellow; stigma-lobes purple, style about as long as longer stamens. Upper Sonoran Zone, San Luis Obispo County, California. Type locality: Santa Margarita Valley.

7. *Godetia hispídula* S. Wats. Glandular *Godetia*. Fig. 3402.

Oenothera hispídula S. Wats. Proc. Amer. Acad. 8: 599. 1873.

Godetia hispídula S. Wats. Bot. Calif. 1: 231. 1876.

Godetia arcuata Jepson, Univ. Calif. Pub. Bot. 2: 335. 1907.

Godetia Hansenii Jepson, op. cit. 336.

Erect, simple or branching from base, 1–6 dm. tall; inflorescence usually glandular-pubescent. Leaf-blades linear to spatulate, 1–5 cm. long, short-petioled; buds nodding; hypanthium slender 4–9 mm. long, green without, usually purple within, inner ring of hairs about one-third way from base; sepals green to rose, 5–15 mm. long, united in anthesis; petals lavender to lilac, broadly cuneate, 1–3 cm. long, not clawed; stamens unequal; stigma-lobes linear, 2–3 mm. long, white or yellow; capsule 1–3 cm. long, 8-ribbed, in dried specimens appearing square with a small nerve between each pair of ribs, glandular-pubescent, on a pedicel 2–8 mm. long, and tapering to a slender beak 3–6 mm. long; seeds dark brown, 1–5 mm. long, cellular-pubescent, with creasing one-fourth length of seed-body.

Foothills, Upper Sonoran Zone; Butte County to Mariposa County, California. Type locality: Sacramento Valley. April–June.

8. *Godetia cylíndrica* (Jepson) C. L. Hitchcock. Cylindrical *Godetia*. Fig. 3403.

Godetia Bottæ var. *cylíndrica* Jepson, Univ. Calif. Pub. Bot. 2: 332. 1907.

Godetia cylíndrica C. L. Hitchcock, Bot. Gaz. 89: 352. 1930.

Erect, slender, simple or branched in upper half, 1–5 dm. tall. Leaf-blades narrowly lanceolate to linear, 2–4 cm. long, with petioles 3–15 mm. long; inflorescence strigillose, the buds nodding; hypanthium slender, 1.5–6 mm. long, green to lavender, with inner ring of hairs one-third

to three-fourths way from base; sepals green, tinged purple, 1-1.5 cm. long, united in anthesis; petals lavender in upper half, shading to yellowish white at base, usually with small purple dots, cuneate to broadly obovate, 8-26 mm. long; stamens unequal; stigma-lobes narrowly ovate, 2-2.5 mm. long; capsule linear, 1.5-4 cm. long, 1-2 mm. thick, sessile or with pedicel 1-4 mm. long, tapering to beak 2-6 mm. long, capsule-ribs 8, which quite disappear in old and dry material; seeds 1 mm. long, dark brown, with cresting inconspicuous.

Dry grassy slopes especially among oaks, Upper Sonoran Zone; California from Fresno and San Luis Obispo Counties to Los Angeles County. Type locality: Waltham Creek, near Alcalde, Fresno County. May-June.

Godetia cylindrica var. *Tracyi* Jepson, Fl. Calif. 2: 584. 1936. Petals blue-purple when dry, 1-3 cm. long; capsule thickened upward, 2-2.5 mm. thick. North Coast Ranges of California. Type locality: Plaskenta, Tehama County.

9. *Godetia Böttae* Spach. Botta's *Godetia*. Fig. 3404.

Godetia Böttae Spach, Ann. Mus. Par. II. 4: 393. 1835.

Oenothera Böttae Torr. & Gray, Fl. N. Amer. 1: 505. 1840.

Erect, simple or branching from base, 1-8 dm. tall, strigillose above. Leaf-blades linear to lanceolate, 15-40 mm. long, 2-4 mm. wide, on petioles 3-10 mm. long; buds nodding; hypanthium 1-4 mm. long, with inner ring of hairs just beneath the summit; sepals usually rose-colored, 1-2 cm. long, united in anthesis or reflexed in pairs; petals lavender, with or without purple dots, cuneate-obovate, 1-2.5 cm. long, narrowed into a claw 1 mm. or less long; stamens unequal; stigma-lobes white or purple, about 2 mm. long; young ovaries erect or deflexed, densely pubescent, but not silvery; capsule 1.5-5 cm. long, 2-3 mm. thick, terete and not ribbed when young, square and sometimes showing median nerve on each face when mature, without beak, or with short one 1-4 mm. long, on pedicel 2-30 mm. long; seeds dark brown, 1 mm. long.

Slopes and hills along the coast, Monterey County to Santa Barbara County, California. Type locality: Monterey. May-June.

Godetia Böttae var. *deflexa* (Jepson) C. L. Hitchcock, Bot. Gaz. 89: 355. 1930. Sepals unusually green; leaves broad, 4-15 mm. wide and 2-7 cm. long; young ovaries deflexed, silvery canescent; plants robust. Coastal slopes, Santa Barbara County to Orange County, California. Type locality: "sandy plains of Los Angeles."

10. *Godetia Dudleyana* Abrams. Dudley's *Godetia*. Fig. 3405.

Godetia Dudleyana Abrams, Fl. Los Ang. 267. 1904.

Godetia Böttae var. *usitata* Jepson, Univ. Calif. Pub. Bot. 2: 332. 1907.

Godetia jucunda Jepson, op. cit. 334.

Erect, usually branching from near middle, occasionally simple, 1.5-7 dm. tall. Leaf-blades narrowly lanceolate to spatulate, 2-5 cm. long, with petioles 3-12 mm. long, finely pubescent; inflorescence finely strigillose, buds nodding; hypanthium 1-4 mm. long, lavender to green, with inner ring of hairs near summit; sepals 6-15 mm. long, lavender, united in anthesis; petals cuneate, pink to deep magenta, shading to white at base, usually with crimson or purple dots in lower portion, 1-3 cm. long, with claw 1-2 mm. long; stamens unequal; stigma-lobes 1-2 mm. long, yellow to lavender; capsule slender, 1-3 cm. long, 1-3 mm. thick, beakless or with beak 1-4 mm. long, usually sessile, or with pedicel 1-5 mm. long, 8-ribbed, terete when fresh, often square and the ribbing obscure when old or dry; seeds 1 mm. long, dark brown, with minute cresting.

Grassy slopes and canyons, Upper Sonoran and Transition Zones; Tuolumne County to Riverside County, California. Type locality: Little Santa Anita Canyon, San Gabriel Mountains. May-July.

11. *Godetia epilobioides* (Nutt.) S. Wats. Willow-herb *Godetia*. Fig. 3406.

Oenothera epilobioides Nutt. in Torr. & Gray, Fl. N. Amer. 1: 511. 1840.

Godetia epilobioides S. Wats. Bot. Calif. 1: 231. 1876.

Clarkia epilobioides Nels. & Macbr. Bot. Gaz. 65: 60. 1918.

Clarkia modesta Jepson, Man. Fl. Pl. Calif. 673. 1925.

Erect, simple to diffusely branched throughout, but usually sparingly branched and only at the middle, 1.5-4.5 dm. tall, strigillose above. Leaf-blades linear to broadly lanceolate or spatulate, 1-4 cm. long, with petioles 2-8 mm. long; buds nodding; hypanthium 1-1.5 mm. long, with inner ring of hairs near summit; sepals united in anthesis, 3-5 mm. long; petals obovate, 6-11 mm. long, white, sometimes pinkish or lavender, with or without purple spots at base, tapering to a short claw; stamens unequal, 2-6 mm. long; stigma-lobes very short, 0.5 mm. long, yellow; capsule linear, 1.5-3 cm. long, 1-1.5 mm. thick, rather densely strigillose when young, less so in age, weakly 8-ribbed, square in dried material, with beak 0.5-2 mm. long and pedicel 1-10 mm. long; seeds dark brown, 0.5 mm. long, cellular-puberulent, with minute cresting.

Chiefly shaded slopes, Upper Sonoran Zone; Contra Costa and Sacramento Counties to San Diego County, California. Most abundant in southern California. Type locality: San Diego. April-May.

12. *Godetia biloba* (Durand) S. Wats. Lobed *Godetia*. Fig. 3407.

Oenothera biloba Durand, Journ. Acad. Phila. II. 3: 87. 1855.

Godetia biloba S. Wats. Bot. Calif. 1: 231. 1876.

Clarkia biloba Nels. & Macbr. Bot. Gaz. 65: 60. 1918.

Godetia biloba var. *Brandegeae* Jepson, Fl. Calif. 2: 585. 1936.

Erect, simple or branching near or above the base, 2-7 dm. tall, strigillose above. Leaves elliptic to linear-elliptic, 1-5 cm. long, with petiole an additional 5-15 mm.; buds drooping; hypanthium 1.5-5 mm. long, usually tinged red, the inner ring of hair near summit; petals magenta, with or without purple dots near the base, cuneate, 1-2 cm. long, with claw 1-2 mm. long and

with apex exceedingly variable, from slightly to deeply retuse and bilobed; stamens subequal, 4–8 mm. long; stigma-lobes 1–1.5 mm. long, lavender; capsule rather short, 1–2.5 cm. long, 1.5–2 mm. thick, on pedicels 1–10 mm. long, beakless or short-beaked, 8-ribbed, terete, often appearing square when dry; seeds 1 mm. long, dark brown, with minute crestring.

Hillsides, Upper Sonoran Zone; Contra Costa County, and Butte County to Mariposa County, California. Type locality: Nevada City, California. May–July.

Godetia pacifica M. E. Peck, Proc. Biol. Soc. Wash. 47: 187. 1934. Slender, simple or branched, 1–4 dm. high. Leaves few, entire, narrowly oblanceolate; flowers few, remote; buds acute at apex; hypanthium 2 mm. long; sepals coalescent in anthesis except at base and apex, and slit to expose petals; petals rhombic-ovate, 9–13 mm. long, pale rose-purple at tips, paler toward the base; capsule narrow-clavate, slightly curved, acutely 4-angled, 2–2.5 cm. long, on pedicels 1–3 mm. long. Near the sea, Lincoln County, Oregon. Type locality: Otter Crest, Lincoln County.

8. OENOTHERA L. Sp. Pl. 346. 1753.

Annual to perennial, caulescent or acaulescent herbs, with alternate or basal leaves. Flowers in ours yellow or white, often aging reddish or purplish. Hypanthium prolonged beyond the ovary, quite deciduous. Sepals 4, reflexed in anthesis. Petals 4. Stamens 8, equal, or if unequal the opposite ones shorter; anthers mostly versatile. Stigma varying from being divided into 4 linear lobes, to discoid or capitate. Capsule membranous to woody, straight to curved or coiled, 4-celled, 4-valved, dehiscent. Seeds many, naked. [Name Greek, meaning wine-scenting, a name given to some now unknown plant, once used for that purpose.]

Genus of perhaps 200 species, mostly of the temperate regions and confined to the New World. Type species, *Oenothera biennis*, L.

Stigma with 4 linear lobes; flowers vespertine.

Capsule terete or round-angled; plants usually with well-developed stems which bear leaves and flowers.

Flowers yellow, the buds erect; seeds prismatic-angled, horizontal, in 2 rows in each cell. (Subgenus *Euoenothera*)

Petals 10–20 mm. long, not usually turning reddish in age.

Sepals with free tips about 2 mm. long; plant grayish-strigose throughout.

1. *O. Rydbergii*.

Sepals with free tips 3 mm. or longer; plant finely pubescent and hirsute, the longer hairs from reddish pustules.

2. *O. biennis*.

Petals 25–40 mm. long, turning reddish in age.

3. *O. Hookeri*.

Flowers white, the buds drooping; seeds cylindric to ovoid, not sharply angled, ascending, in 1 row in each cell. (Subgenus *Anogra*)

Plants spring or winter annuals, coarse; basal leaf-blades rhombic, 2–8 cm. long; capsules woody, with exfoliating epidermis, 2–7 cm. long; seeds 1.5–2 mm. long; buds often shaggy.

4. *O. deltoides*.

Plants perennial; basal leaves smaller and narrower; capsules not woody.

Capsules often contorted; seeds linear-obovoid.

5. *O. pallida*.

Capsules not contorted; seeds plump, ovoid.

6. *O. californica*.

Capsule crested or winged; plants usually acaulescent or nearly so, the leaves largely basal.

Capsule tapering toward apex, not enlarged in upper half; seeds in 2 rows in each cell. (Subgenus *Pachylophus*)

Flowers white; capsule oblong-ovoid, 2–3 cm. long, with low tubercles on the rounded angles; seeds 3 mm. long, conspicuously furrowed along the raphe.

7. *O. caespitosa*.

Flowers yellow; capsule attenuate toward apex.

Capsule 3.5–6 cm. long, winged on angles along the lower half; seeds with broad flat open depression along the raphe; plant of pine belt.

8. *O. xylocarpa*.

Capsule 1.8–3.5 cm. long, not winged; seeds with narrow raphal groove; desert plants.

9. *O. primiveris*.

Capsule enlarged in upper half, woody, winged especially above, 1–2 cm. long; flowers yellow; seeds cuneate-obovoid. (Subgenus *Lavauria*)

10. *O. flava*.

Stigma capitate; flowers diurnal.

Hypanthium about 1 mm. long, orange and pubescent within and lined with a lobed disk; plants erect, annual, 2–10 dm. tall. (Subgenus *Eulobus*)

11. *O. leptocarpa*.

Hypanthium not lined with a lobed disk.

Plants usually acaulescent; ovary fertile only in lower portion, gradually narrowed above into a persistent sterile tubular filiform portion equaling or much exceeding the fertile part and simulating an elongate hypanthium; flowers yellow. (Subgenus *Taxaria*)

Capsules broadly and truncately 4-winged, not over 1 cm. long; seeds obovoid; annuals.

Flowers small, the petals 2.5–3 mm. long; sterile portion of the ovary 10–15 mm. long; epidermis of stems exfoliating.

12. *O. Palmeri*.

Flowers larger, the petals 8–12 mm. long; sterile portion of ovary 12–35 mm. long; epidermis not readily exfoliating.

13. *O. graciliflora*.

Capsules somewhat cylindrical, at most angled, not winged, attenuate gradually at tip into sterile portion mostly over 1 cm. long; seeds not pointed at one end; perennials, acaulescent.

Leaves entire or with few teeth; capsule glabrous.

Plants glabrous to glabrate; sterile portion of mature ovary 2–6 cm. long; capsules oblong-ovoid, 5 mm. or more thick; seeds 3 mm. long, distinctly minutely pitted.

14. *O. heterantha*.

Plants minutely pubescent, especially on veins and leaf-margins; sterile portion of ovary 5–12 cm. long; capsules linear, not over 3 mm. thick; seeds 2 mm. long, with a scurfy surface.

15. *O. ovata*.

Leaves deeply pinnatifid; capsule densely pubescent; sterile portion of ovary 25–80 mm. long; capsules ovoid, straight.

16. *O. tanacetifolia*.

Plants caulescent; ovary fertile to summit, not prolonged into long sterile portion.

Capsule nearly or quite sessile. (Subgenus *Sphaerostigma*; see also *O. cardiophylla*.)

Flowers white (yellowish in *minor* and red in one var. of *decorticans*), often drying pinkish; borne in terminal spikes.

Capsules cylindrical, terete, linear, not thickened in lower portion, scarcely if at all coiled, not noticeably attenuate at tip.

Petals 5–7 mm. long, suborbicular; style exceeding corolla, 10–13 mm. long; hypanthium 4–6 mm. long; capsules refracted or spreading, occasionally coiled.

17. *O. refracta*.

Petals 3 mm. long, spatulate; style shorter than corolla, 3–4 mm. long; hypanthium 2.5–3 mm. long; capsules divaricately spreading.

18. *O. chamaenerioides*.

Capsules not strictly cylindrical, but somewhat enlarged near base and attenuate at tip.

Mature capsules usually distinctly contorted and coiled, not merely bent and curved, quite slender, not subfusiform in shape (see also *O. decorticans desertorum*).

Flowers minute; petals 1–2 mm. long, narrowly obovate; style 1.5 mm. long; hypanthium 1 mm. long; filaments distinctly unequal.

19. *O. minor Cusickii*.

Flowers larger; petals 3.5–5 mm. long, orbicular-ovate; style 6–12 mm. long; hypanthium 3–8 mm. long; filaments subequal.

Flowers and leaves arranged in spicate tufts at ends of naked prostrate branches or on short central stalk; capsules 10–12 mm. long, conspicuously quadrangular.

20. *O. nevadensis*.

Flowers and leaves continuous from base of stems, not in terminal tufts; capsules 14–23 mm. long, not conspicuously quadrangular.

21. *O. alyssoides*.

Mature capsules merely curved or bent, not distinctly contorted or coiled, subfusiform in shape.

Leaves largely near base, glabrate, lance-ovate to oblanceolate; stems glabrous or glabrate, with epidermis exfoliating promptly; capsule 15–25 mm. long; seeds ash-colored and linear-obovoid.

22. *O. decorticans*.

Leaves well-distributed, glandular-pubescent to glandular-villous, ovate to oblong-ovate; stems glandular; epidermis exfoliating tardily if at all; capsule 10–15 mm. long; seeds brownish, rhomboid-prismatic.

23. *O. Boothii*.

Flowers yellow, often drying greenish, borne in axils of foliage-leaves.

Capsules terete, cylindrical or subfusiform, but not quadrangular; leaves narrow, 1–4 mm. wide, usually linear-oblong.

Plant with several naked, fine, often capillary stems, each bearing leafy inflorescence at tip; capsule subfusiform, almost straight, 5–8 mm. long.

24. *O. andina*.

Plants with stems leafy from base; capsules terete, straight or coiled, 15–40 mm. long.

Flowers small; petals 2.5–3.5 mm. long; sepals 1.5–3.5 mm. long.

25. *O. contorta*.

Flowers larger; petals 5–15 mm. long; sepals 3–12 mm. long.

26. *O. dentata campestris*.

Capsules quadrangular; leaves 5–20 mm. wide, lanceolate to ovate.

Flowers small; petals 1.5–7 mm. long.

27. *O. micrantha*.

Flowers larger; petals 8–22 mm. long.

Plants of sea bluffs and inland, greenish except in a desert form; cauline leaves lanceolate to lance-ovate, acute, wavy-margined, thin.

28. *O. bistorta*.

Plants of sea beaches, grayish to silvery (except in var. *nitida*); cauline leaves lance-oblong to orbicular-ovate, obtuse, not wavy-margined, thick.

29. *O. cheiranthifolia*.

Capsules long-pedicelled. (Subgenus *Chylismia*)

Seeds oblong and with an incurving wing, making them appear somewhat boat-shaped, cellular-pubescent; small slender plants, villous below, finely glandular-pubescent above with pinkish white axillary flowers 4–5 mm. across.

30. *O. pterosperma*.

Seeds obovoid, rounded or angled, not winged; flowers not axillary, but in terminal racemes or panicles.

Leaves orbicular-cordate, well distributed, not at all pinnatifid.

31. *O. cardiophylla*.

Leaves ovate, oblong or lanceolate, commonly pinnatifid and near base of plant (except in *O. kernensis*).

Capsules linear, elongate, usually over 2 cm. long.

Leaves not in basal rosette, stem-leaves secund; plant 8–12 cm. high.

32. *O. kernensis*.

Leaves in basal rosette; plant 10–60 cm. tall.

Stems coarse, commonly branched only at base if at all; pedicels 3–15 mm. long; capsules linear, widely spreading, commonly 5–9 cm. long; anthers hairy.

33. *O. brevipes*.

Stems slender, commonly branched above; pedicels capillary, 10–25 mm. long; capsules linear, 15–35 mm. long; anthers glabrous.

34. *O. multijuga parviflora*.

Capsules somewhat clavate, usually less than 2 cm. long.

Branches in well-developed plants few to several and arising at base of plant only, not capillary; capsules 10–25 mm. long; anthers linear, beset with scattering white hairs; style longer than petals.

Stems slender; flowers few, not congested; leaves ovate, subentire; petals usually less than 4 mm. long.

35. *O. scapoidea scorsa*.

Stems fairly coarse; flowers crowded in close terminal clusters; leaves frequently with supplementary pinnules on petioles; petals 4–7 mm. long.

36. *O. claviformis*.

Branches in well-developed plants capillary and arising freely throughout the plant; anthers oblong, glabrous; style not longer than petals.

37. *O. heterochroma*.



3399



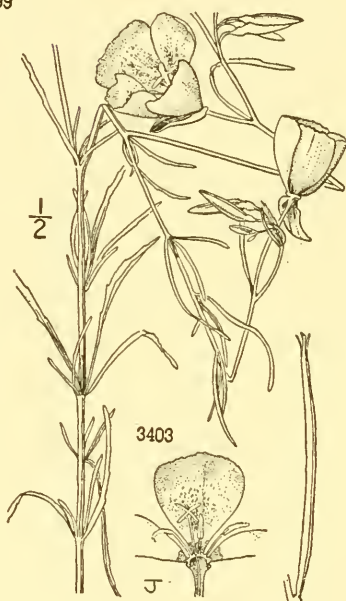
3400



3401



3402



3403



3404



3405



3406



3407

3399. *Godetia Whitneyi*
 3400. *Godetia viminea*
 3401. *Godetia parviflora*

3402. *Godetia hispidula*
 3403. *Godetia cylindrica*
 3404. *Godetia Bottae*

3405. *Godetia Dudleyana*
 3406. *Godetia epilobioides*
 3407. *Godetia biloba*

1. *Oenothera Rydbergii* House. Rydberg's Evening-primrose. Fig. 3408.

Onagra strigosa Rydb. Mem. N.Y. Bot. Gard. 1: 278. 1900.

Oenothera biennis var. *strigosa* Piper in Piper & Beattie, Fl. Palouse Reg. 124. 1901.

Oenothera strigosa Mack. & Bush, Fl. Jackson Co. Mo. 139. 1902. Not *O. strigosa* Willd., a herbarium name as synonym in Sprengel, Syst. 2: 228. 1825.

Oenothera Rydbergii House, N.Y. State Mus. Bull. No. 233-234: 61. 1921.

Biennial, grayish-strigose throughout, erect, largely unbranched, 3-10 dm. tall, strigose and hirsute, sometimes with reddish tinge. Lowest leaves spatulate, obtuse, 3-10 cm. long, 1-2 cm. wide, with petioles an additional 1-3 cm. long, these leaves passing gradually into lanceolate, acute, repand-denticulate leaves of the stem, with shorter petioles; inflorescence with leafy lanceolate, subsessile bracts 1-5 cm. long; flowers vespertine; bracts longer than mature capsules; hypanthium 3-4 cm. long, pubescent within, often hirsute without; sepals strigose and hirsute, 10-15 mm. long, with free tips 2 mm. long; petals yellow, broadly obcordate, 1.2-2 cm. long; stamens quite equal, about as long as petals, glabrous; style pubescent on lower portion; stigma-lobes 5-7 mm. long; capsule 2.5-3.5 cm. long, tapering slightly; seeds reddish brown, obtusely angled, irregular, 1-1.5 mm. long.

Moist places, meadows, stream banks, Upper Sonoran and Transition Zones; from eastern Washington and Oregon to Minnesota and Kansas. Type locality: Pony, Montana. July-Aug.

Oenothera cheradophila Bartlett, Bot. Gaz. 44: 302. 1907. Not certainly distinct from *O. Rydbergii*, differing by: sepal-tips 1 mm. long; petals about 8 mm. long; floral bracts usually much shorter than mature capsules. Southeastern Washington. Type locality: Bingen, Washington.

2. *Oenothera biennis* L. Small-flowered Evening-primrose. Fig. 3409.

Oenothera biennis L. Sp. Pl. 346. 1753.

Much like the preceding species, simple or branched, stems reddish, finely pubescent and hirsute, the larger hairs from reddish pustules. Cauline leaves broadly lanceolate to narrowly rhomboid; flowers and buds in dense corymbose clusters; sepals with free tips 3-4 mm. long; petals 12-15 mm. long.

Moist places, Transition Zones; western Washington and Oregon into Canada, then east to Atlantic Coast. Type locality: "Virginia." July-Aug.

3. *Oenothera Hookeri* Torr. & Gray. Hooker's Evening-primrose. Fig. 3410.

Oenothera Hookeri Torr. & Gray, Fl. N. Amer. 1: 493. 1840.

Oenothera Jepsonii Greene, Fl. Fran. 211. 1891.

Onagra Hookeri Small, Bull. Torrey Club 23: 171. 1896.

Oenothera franciscana Bartlett, Rhodora 16: 35. 1914.

Perennial, or possibly short-lived perennial, largely with spreading pubescence; the stems hirsute, muricate with reddish pustules, simple and erect, or somewhat branched mostly from the base, 6-12 dm. tall. Lower leaves oblanceolate to spatulate with blades 5-20 cm. long, on petioles half as long; cauline leaves narrowly to broadly lanceolate, on shorter petioles, sinuate-denticulate, green, wavy, soft-hairy, gradually reduced up the stem to the leafy bracts of the elongate inflorescence; hypanthium 3.5-4 cm. long, pubescent within; sepals red, densely hirsute, conspicuously papillose at base of longer hairs, 22-25 mm. long; petals 25-35 mm. long, yellow but turning reddish in age, broadly obovate; stamens equal, two-thirds as long as petals; stigma-lobes 4-6 mm. long; capsule obtusely quadrangular, 2-5 cm. long, hirsute; seeds reddish brown, sharply angled, 1.5 mm. long.

Moist places, Upper Sonoran and lower Transition Zones; largely from Lake and Sutter Counties to San Luis Obispo County, California. Type locality: California, probably San Francisco. June-Sept.

Oenothera Hookeri subsp. *montereyensis* Munz, El Aliso 2: 14. 1949. Plants bushy; flowers large; buds blunt, the sepal-tips 1-2.5 mm. long; sepals with short gland-tipped hairs and papillose at base of longer hairs. Sea cliffs, central California, San Mateo County to San Luis Obispo County. Type locality: Alder Creek, Monterey County.

Oenothera Hookeri subsp. *Wolfei* Munz, op. cit. 16. Flowers small, the petals 2-2.5 cm. long; sepals glandular-pubescent and papillose at base of longer hairs; sepal-tips 2-3 mm. long. In sand or gravel along streams, Jackson County, Oregon, to Trinity and Humboldt Counties, California. Type locality: near Trinidad, Humboldt County.

Oenothera Hookeri subsp. *venusta* Munz, op. cit. 21. (*Oenothera venusta* Bartlett, Rhodora 16: 36. 1914.) Whole plant rather grayish; stems 1.5-2 m. tall, freely branched throughout, hirsute and muricate; leaves soft-hairy, wavy; sepals green, sparsely hirsute, scarcely papillose at base of hairs; petals 3-4 cm. long; capsule hirsute. Moist places, Upper Sonoran and lower Transition Zones below 4,500 feet, central interior to southern California. Type locality: San Bernardino, California.

Oenothera Hookeri subsp. *ornata* (A. Nels.) Munz, op. cit. 25. (*Onagra ornata* A. Nels. Bot. Mag. 52: 268. 1911.) Stem-leaves plane; sepals pilose and glandular-pubescent; sepal-tips 2.5-4 mm. long; seeds about 1.3 mm. long. Eastern Washington and western Idaho. Type locality: Boise, Idaho.

Oenothera Hookeri subsp. *angustifolia* (Gates) Munz, op. cit. 26. (*Oenothera Hookeri* var. *angustifolia* Gates, Mut. Factor in Evol. 10, 30. 1915.) Stems reddish, 3-9 dm. high, somewhat muricate, simple or few-branched mostly from base; leaves plane, green, not conspicuously soft-hairy; sepals red, with long spreading hairs and short gland-tipped ones, scarcely or not at all papillose. Transition Zone, mostly above 5,100 feet, eastern Washington to southern California and east to Idaho, Colorado, and New Mexico. Type locality: Asphalt, Utah.

Oenothera Hookeri subsp. *grisea* Munz, op. cit. 29. (*Oenothera venusta* var. *grisea* Bartlett, Rhodora 16: 36. 1914.) Tall and freely branched, with mostly appressed pubescence, plant more or less ashy; stems not or little muricate; sepals green, not papillose; capsule not or scarcely hirsute. Wet places, Upper Sonoran Zone, southern California into adjacent Lower California. Type locality: Riverside, Riverside County, California.

× *Oenothera erythrosépala* Borb. Magyar Bot. Lapok. 2: 245. 1903. Very near to *O. Hookeri* and differing from it by the broader, more crinkled leaves, the upper ones sessile, by the broad floral bracts, and by the perhaps paler yellow petals, there is an escape along the northern California coast to western Washington. It is the plant distributed by De Vries as *O. Lamarkiana*, but is not *O. Lamarkiana* Sér.

Oenothera longissima subsp. Clutei (A. Nels.) Munz, op. cit. 46. (*Oenothera Clutei* A. Nels. Amer. Bot. 22: 22. 1922.) Like *O. Hookeri*, but with hypanthium 8–12 cm. long. California (eastern Mojave Desert) to southern Utah. Type locality: Navajo Mountains, Coconino County, Arizona.

Oenothera stricta Ledeb. in Link, Enum. Hort. Berol. 1: 377. 1821. (*Oenothera arguta* Greene, Fl. Fran. 212. 1891.) Decumbent perennial about 3 dm. tall with linear-lanceolate, saliently dentate leaves, the cauline broadest at the sessile, somewhat clasping base. A South American species growing spontaneously on the southern shore of Monterey Bay, California.

Oenothera laciniàta Hill, Hort. Kew. 172. pl. 6. 1769. This species of the subgenus *Raimannia* can be distinguished by its erect buds; petals pale yellow, about 1 cm. long; seeds not angled, yellowish, pitted; capsule narrowly cylindrical; leaves sinuate-dentate or pinnatifid. Native of the southern and eastern states and sparingly naturalized, as at Pasadena and Banning, California. Type locality: Carolina.

Oenothera speciosa Nutt. Journ. Acad. Phila. 2: 119. 1821. This species is of the subgenus *Hartmannia* and is characterized by having leaves lanceolate, sinuate or pinnatifid; flowers large, white, the petals 3–4 cm. long; capsules 4-winged and 4-ribbed, clavate, 1–1.5 cm. long. Native from Arizona eastward. Sparingly naturalized as at Pomona, California. A pink-flowered form (*Oenothera speciosa* var. *Childsii* (Bailey) Munz, Leaflets W. Bot. 2: 87. 1938.) native along the gulf coast of Texas is in common cultivation as Mexican Evening-primrose.

4. *Oenothera deltoïdes* Torr. & Frem. Large Desert Evening-primrose. Fig. 3411.

Oenothera deltoïdes Torr. & Frem. in Frem. Second Rep. 315. 1845.

Oenothera trichocalyx of authors for much of our material, not Nutt.

Coarse spring or winter annuals, simple or more frequently with central erect stem, 5–25 cm. tall, and few to several decumbent branches naked at the base and 5–100 cm. long; stems pale green, with exfoliating epidermis, glabrous in lower parts, with spreading hairs in upper parts. Lower leaves in sort of rosette, the blades rhombic-obovate to rhombic-lanceolate or oblanceolate, subentire to remotely denticulate or even dentate, 2–8 cm. long, narrowed into slightly winged petioles of same or less length; cauline leaves gradually somewhat reduced, becoming sessile and dentate, but not pinnatifid; flowers solitary in axils, vespertine, buds nodding, obtuse; hypanthium slender, 2–4 cm. long, it and buds having straight spreading hairs 1–1.5 mm. long; sepals lance-linear, 15–35 mm. long; petals white, turning pink with age, 2–4 cm. long; stamens subequal; stigma-lobes 3–6 mm. long; capsules spreading, even reflexed, woody, with exfoliating epidermis, prismatic-cylindric, 4–5 (7) cm. long, commonly 2–3 mm. thick at base; seeds narrowly obovoid, 1.5–2 mm. long, light brown, usually with purple spots and rows of minute cellular pitting.

Sandy places, Lower Sonoran Zone; deserts of southern California and adjacent Arizona. Type locality not given. March–May.

Oenothera deltoïdes var. *Howellii* Munz, El Aliso 2: 81. 1949. Leaves runcinate-pinnatifid, lanceolate, 3–12 cm. long, 1–3 cm. wide, cinereous; buds acute. Sand dunes, Antioch, Contra Costa County, California.

Oenothera deltoïdes var. *Piperi* Munz, Amer. Journ. Bot. 18: 314. 1931. Plants low, frequently less than 1 dm. tall and often simple; upper leaves lanceolate in outline and deeply and regularly sinuate-dentate to pinnatifid, with rachis 3–4 mm. wide, well provided with long soft curly hairs, about 2 mm. long; ovary and sepals with same hairs; petals usually less than 2 cm. long; capsules 1.5–3 cm. long, 3–5 mm. thick at base. Upper Sonoran Zone from eastern Oregon and northeastern California and western Nevada. Type locality: Man's Lake, eastern Oregon.

Oenothera deltoïdes var. *cognàta* (Jepson) Munz, op. cit. 313. Plants commonly 2–4 dm. tall and branched from base; upper leaves coarsely sinuate-dentate but rarely pinnatifid, blades 5–10 mm. wide; hair on upper parts as in *Piperi*; petals 2.5–3.5 cm. long; capsules 2.5–7 cm. long, 3–5 mm. thick at base. Sandy plains, Upper Sonoran Zone; Great Valley of California, and western end of Mojave Desert. Type locality: Corral Hollow, Alameda County, California.

Oenothera deltoïdes var. *cineràcea* (Jepson) Munz, op. cit. 316. Habit, foliage, and flowers as in the species, but hair short, less than 1 mm. long and closely appressed. Sandy desert, Lower Sonoran Zone, southern part of California and adjacent Arizona. Type locality: Borrego Springs, San Diego County, California.

5. *Oenothera pallida* Lindl. Pallid Evening-primrose. Fig. 3412.

Oenothera pallida Lindl. Bot. Reg. 14: pl. 1142. 1828.

Anogra Douglasiana Spach, Ann. Mus. Paris II. 4: 339. 1835.

Oenothera leptophylla Nutt. ex S. Wats. Proc. Amer. Acad. 8: 602. 1873.

Anogra pallida Britt. Mem. Torrey Club 5: 234. 1894, in part.

Strongly rooted perennial, with creeping rootstalks, with main stem erect, 2–5 dm. tall, and several spreading or ascending branches, epidermis white, quite glabrous and exfoliating, or with few scattering long hairs in upper parts. Cauline leaves mostly lanceolate to lance-linear, subentire to remotely denticulate or sinuate-dentate, usually with undulate margin; the blades 2–6 cm. long, sessile or short petioled; flowers vespertine, fragrant; buds acuminate, nodding; hypanthium very slender, frequently reddish, 2–3.5 cm. long, usually glabrous; sepals 12–18 mm. long, the free tips 0.5–2 mm. long; petals white, turning pink, broadly obovate, 1–3 cm. long; stamens subequal, glabrous; capsule usually curved, often somewhat contorted, glabrate, 1.5–4 cm. long, subcylindric, 2–3 mm. thick at base, tapering gradually toward apex; seeds in 1 row, linear-obovoid, 1.5–2 mm. long, brown with dark spots or quite dark, minutely pitted under strong lens.

Sandy places and dry plains, Upper Sonoran Zone; eastern Washington and Oregon to Utah and New Mexico. Type locality: "north-west of North America." Collected by Douglas. May–Aug.

6. *Oenothera californica* S. Wats. California Evening-primrose. Fig. 3413.

Oenothera albicaulis var. *californica* S. Wats. Proc. Amer. Acad. 8: 582. 1873.

Oenothera californica S. Wats. Bot. Calif. 1: 223. 1876.

Anogra californica Small, Bull. Torrey Club 23: 176. 1896.

Oenothera pallida var. *californica* Jepson, Man. Fl. Pl. Calif. 681. 1925.

Perennial from underground rootstalks, rather coarse-stemmed, rarely simple, usually branched, 1-4 (6) dm. tall, frequently decumbent or ascending, ashy with short appressed hairs throughout and with some longer spreading ones in upper parts, epidermis exfoliating. Leaves variable, blades of lower ones oblanceolate to spatulate in outline, of cauline ones oblong to lanceolate, all varying from subentire to deeply and regularly sinuate-dentate, 1-6 cm. long, sessile or on very short petioles; flowers several, vespertine; buds nodding; hypanthium slender, 2-4 cm. long, strigillose and villous; sepals lance-linear, 1.5-2 cm. long, with free tips very short or quite wanting; petals orbicular-obovate, 2-3 cm. long, frequently emarginate and with small tooth in sinus; stamens subequal; stigma-lobes 4-6 mm. long; capsule terete, usually divaricate and somewhat curved upwards, 2-5 cm. long, about 3 mm. thick near the base; seeds plump, obovoid, about 1.5 mm. long, brown with dark spots.

Dry planes, Upper Sonoran and lower Transition Zones; California from Ventura County to Lower California, and along the edge of the desert to Mono County and Nevada. Type locality: California. April-June.

Oenothera californica var. *glabrata* Munz, Amer. Journ. Bot. 18: 327. 1931. (*Oenothera pallida* Jepson, Man. Fl. Pl. Calif. 681. 1925. Not Lindl.) Like the species but glabrous throughout. Upper Sonoran Zone of cismontane Riverside, San Bernardino, and Los Angeles Counties, California. Type locality: vicinity of San Bernardino, California.

7. *Oenothera caespitosa* Nutt. Cespitose Evening-primrose. Fig. 3414.

Oenothera caespitosa Nutt. ex Fraser's Cat. no. 53. 1813; Sims, Bot. Mag. 39: pl. 1593. 1813.

Pachylophus caespitosus Raimann in Engler & Prantl, Nat. Pflanzenf. 37: 215. 1893.

Cespitose perennial, acaulescent or nearly so, quite glabrous throughout. Leaves oblanceolate, the blades 3-10 cm. long, sinuate-dentate to subentire, on winged petioles of about same length; flowers fragrant, vespertine; hypanthium 5-8 cm. long, often tinged reddish; sepals 2.5-3.5 cm. long, with scarcely any free tips; petals white, aging pink, broadly obcordate, 2.5-4 cm. long; stamens subequal, glabrous; stigma-lobes 5-8 mm. long; capsule lance-ovoid, 2-3 cm. long, with low rounded tubercles on the angles; seeds dark brown, about 3 mm. long, obovoid, minutely cellular-roughened, conspicuously furrowed along the raphe.

This glabrous typical form of the species is rare in our range and extends from eastern Oregon to Dakota. Type locality: Upper Louisiana, on the banks of the Missouri River. May-July.

Oenothera caespitosa var. *montana* (Nutt.) Durand, Bot. Basin Great Salt Lake 164. 1859. (*Oenothera montana* Nutt. in Torr. & Gray, Fl. N. Amer. 1: 500. 1840; *Pachylophus montanus* A. Nels. Bull. Torrey Club 26: 128. 1899.) Plant acaulescent; leaves canescent-pubescent on margins; hypanthium 3-8 cm. long; capsule sessile, ovoid, not tubercled, about 2 cm. long. Dry slopes, Upper Sonoran Zone; from eastern Oregon to Inyo County, California, and to Colorado and Nebraska. Type locality: "Plains of the Platte in the Rocky Mountains."

Oenothera caespitosa var. *purpurea* (S. Wats.) Munz, Amer. Journ. Bot. 18: 730. 1931. (*Oenothera marginata* var. *purpurea* S. Wats. Bot. King Expl. 108. 1871; *Pachylophus canescens* Piper, Contr. U.S. Nat. Herb. 11: 409. 1906.) Acaulescent, densely canescent throughout with a fine appressed pubescence; capsule linear-oblong, 2-3 cm. long, sessile, with low rounded tubercles. Dry slopes, Upper Sonoran Zone; eastern Washington and Oregon and adjacent California to the Rocky Mountains. Type locality: east Humboldt Mountains, Nevada.

Oenothera caespitosa var. *marginata* (Nutt.) Munz, op. cit. 733. (*Oenothera marginata* Nutt. ex Hook. & Arn. Bot. Beechey 342. 1838.) Villous-hirsute, frequently caulescent; leaves linear-lanceolate, sinuate-pinnatifid; capsule 3-4 cm. long, pedicelled, linear-cylindric, scarcely ridged, with low tubercles. Dry slopes, chiefly Upper Sonoran Zone; eastern Washington to eastern California and Utah. Type locality: "Rocky Mountains in Upper California, about lat. 42°."

Oenothera caespitosa var. *longiflora* (Heller) Munz, op. cit. 734. (*Anogra longiflora* Heller, Muhlenbergia 2: 224. 1906.) Plant subglabrous except for a few hairs along the margins of the leaves, about the ovaries and sepals, which latter may also be finely glandular-puberulent; otherwise much as in *marginata*. Dry slopes, Inyo County, California, to adjacent Nevada. Type locality: Silver Canyon, White Mountains, Inyo County, California.

8. *Oenothera xylocarpa* Coville. Woody-fruited Evening-primrose. Fig. 3415.

Oenothera xylocarpa Coville, Contr. U.S. Nat. Herb. 4: 105. pl. 8. 1893.

Anogra xylocarpa Small, Bull. Torrey Club 23: 174. 1896.

Acaulescent perennial with thick vertical root and thick caudex surmounted by crown of leaves at surface of ground. Leaf-blades pinnately parted, often spotted red, 2-7 cm. long, broadly oblanceolate to obovate in outline, with a dense soft, sometimes canescent pubescence, terminal lobe much the largest, petioles about as long as blades; flowers vespertine; hypanthium slender, almost villous, 2.5-4.5 cm. long; sepals 2-3 cm. long; petals bright yellow, aging salmon-red, 2.5-3 cm. long, with broad sinus 4-5 mm. deep; stamens subequal; stigma-lobes 4-5 mm. long; capsule somewhat woody, 3.5-6 cm. long, the body proper 7-8 mm. thick at base and winged, tapering gradually into a long slender wingless upper portion, capsule 4-faced, with medium nerve on each face; seeds in 2 rows in each cell, brownish, 2-2.5 mm. long, narrowly obovoid, angled, roughened and minutely tubercled, with a broad flat raphe.

Dry benches among pines, Arid Transition Zone; east slope of the Sierra Nevada, Mono County to Tulare County, California; Washoe County, Nevada. Type locality: west side of Whitney Meadows, later called Volcano Meadows, in Upper Kern River Basin, Tulare County, California. June-Aug.

9. *Oenothera primivèris* A. Gray. Yellow Desert Evening-primrose. Fig. 3416.

Oenothera primivèris A. Gray, Smiths. Contr. 5^o: 58. 1853.

Lavauxia primivèris Small, Bull. Torrey Club 23: 182. 1896.

Oenothera bufonis M. E. Jones, Contr. West. Bot. No. 8: 28. 1898.

Lavauxia lobata A. Nels. Bot. Gaz. 47: 429. 1909.

Apparently annual or winter annual, with long taproot, caespitose, acaulescent or nearly so, occasionally with stems up to 1 dm. long, villous or pilose-pubescent throughout, the leaf-surfaces sometimes glabrate. Leaf-blades oblanceolate in outline, 1–12 cm. long, usually deeply and regularly pinnatifid into lanceolate or ovate lobes which are in turn lobed or toothed, petioles shorter than blades; flowers vespertine; hypanthium 2–6 cm. long; sepals lance-linear, 15–28 mm. long, without free tips; petals canary yellow, aging orange-red, cuneate-obovate, usually 2–3 cm. long, with a terminal sinus 4–5 mm. deep; stamens subequal; stigma-lobes 6–8 mm. long; capsule pilose, quadrangular with heavy rib down middle of each face, reticulate, not winged nor tuberculate, gradually tapering to attenuate apex, 6–8 mm. thick at base, 18–35 mm. long; seeds in 2 rows in each cell, brown, somewhat roughened tuberculate, 2.5–3 mm. long, with narrow raphal groove.

Dry plains, Lower Sonoran Zone; deserts from California to St. George, Utah, and El Paso, Texas. Type locality: El Paso. April–May.

10. *Oenothera flava* (A. Nels.) Garrett. Dandelion-like Evening-primrose.

Fig. 3417.

Oenothera triloba var. *ecristata* M. E. Jones, Proc. Calif. Acad. II. 5: 681. 1895.

Lavauxia flava A. Nels. Bull. Torrey Club 31: 243. 1904.

Oenothera flava Garrett, Spring Fl. Wasatch ed. 4. 106. 1927.

Perennial, with thick taproot, acaulescent or nearly so, glabrate throughout or finely glandular or pubescent about flowers. Leaf-blades oblong-linear to oblanceolate in outline, 3–20 cm. long, 1–2 cm. wide, deeply and irregularly runcinate-pinnatifid, with a broadly winged rachis passing gradually into the lanceolate to lance-linear terminal lobe, petiole slightly winged, shorter than blade; hypanthium slender, 2–12 cm. long; sepals distinct or united in anthesis, reflexed, lance-linear, green, often drying purplish, 10–18 mm. long, with free tips an additional 1–5 mm. long; flowers vespertine, the petals pale yellow, 10–20 mm. long, orbicular-obovate; stamens subequal; stigma-lobes 3–4 mm. long; capsule indurate, ovate, 1–2 cm. long, 4-winged, each wing reticulate-veined, 2–5 mm. wide, especially above, and with a spreading terminal valve-like tooth 0.5–1.5 mm. long; seeds numerous, dark brown, 2 mm. long, minutely granular, cuneate-obovoid, slightly concave with carinate ridge on ventral side, and wing-like margin around the obtuse summit.

About desiccating depressions, plateau region, high Upper Sonoran and Transition Zones; Shasta, Lassen, Sierra, and Modoc Counties, California, Yakima River, Washington, Saskatchewan to Colorado, northern Mexico, and Arizona. Type locality: Laramie, Wyoming. May–July.

11. *Oenothera leptocarpa* Greene. Mustard-like Primrose. Fig. 3418.

Eulobus californicus Nutt. in Torr. & Gray, Fl. N. Amer. 1: 515. 1840.

Oenothera californica Greene, Pittonia 1: 290. 1889. Not S. Wats. 1876.

Oenothera leptocarpa Greene, op. cit. 302.

Annual, erect, fairly coarse-stemmed, simple or with few stiff branches; stems glabrous or glabrate, somewhat glaucescent. Leaves few, largely in basal rosette, these lanceolate in outline, pinnatifid, 5–15 cm. long, dying early, the cauline leaves smaller, remote, uppermost pendulous, the upper stems appearing quite naked; flowers solitary, not crowded; hypanthium obconic, 1 mm. long, orange and pubescent within and lined with a lobed disk, glabrous to strigillose without; sepals lanceolate, 5–8 mm. long, glabrous to pubescent, reflexed in anthesis; petals yellow or orange, drying pink, frequently with reddish spots at the base, 6–14 mm. long, rhombic-obovate; stamens of two lengths; stigma globose; capsules linear, quadrangular, not contorted, commonly strongly refracted, 3–10 cm. long, about 1 mm. thick, not conspicuously beaked; seeds obovoid, light brown with purplish dots, minutely cellular-pitted, 1 mm. long.

Dry banks and disturbed places, Upper Sonoran Zone; cismontane southern California and adjacent Lower California, occasional in Lower Sonoran Zone of Arizona and Sonora. Type locality: San Diego, California. April–May.

12. *Oenothera Palmeri* S. Wats. Palmer's Primrose. Fig. 3419.

Oenothera Palmeri S. Wats. Proc. Amer. Acad. 12: 251. 1877.

Taraxia Palmeri Small, Bull. Torrey Club 23: 184. 1896.

Dwarf, caespitose annual with slender taproot, finely strigillose throughout, forming small acaulescent tufts 2–6 cm. tall, or with several short horizontal branches 2–4 cm. long; stems pubescent, with loose white exfoliating epidermis and becoming tough and almost woody in age. Leaves linear-lanceolate to –oblanceolate, subsentire to minutely denticulate, 2–6 cm. long; sterile portion of upper part of ovary filiform, 8–18 mm. long; hypanthium proper obconic, 1–2 mm. long; sepals lanceolate, 2–3 mm. long; petals yellow, orbicular-obovate, 3–5 mm. long, the flowers apparently diurnal; stamens of 2 unequal sets; stigma globose; capsules crowded, ovate, 5–7 mm. long, coriaceous and tough, 4-angled below, each angle growing into a thick, obliquely truncate wing along the upper edge of which is the line of dehiscence; seeds smooth, few, brownish, narrowly obovoid, 1.5 mm. long, minutely cellular-pitted.

Open places, Upper and Lower Sonoran Zones; eastern Oregon to the Mojave Desert, California, and Arizona. Type locality: Arizona. April–May.

13. *Oenothera graciliflora* Hook. & Arn. Slender-flowered Primrose. Fig. 3420.

Oenothera graciliflora Hook. & Arn. Bot. Beechey 341. 1838.

Taraxia graciliflora Raimann in Engl. & Prantl, Nat. Pflanzenf. 37: 216. 1893.

Cespitose annual with slender taproot, plant unbranched and with a single acaulescent tuft, or with several short horizontal branches becoming 1–3 cm. long, finely pubescent to hirsute throughout. Leaves linear to linear-oblancoolate, entire or remotely denticulate, 2–10 cm. long; sterile portion of ovary filiform, 15–40 mm. long; hypanthium proper 2 mm. long; sepals lance-acuminate, 6–8 mm. long; petals yellow, turning red in age, 8–14 mm. long, with a broad shallow apical notch in which is a middle tooth; stamens unequal; stigma globose; capsule ovate-oblong, 8–12 mm. long, coriaceous, 4-angled near base, each angle expanding upward into a broad wing giving the capsule a truncate apex; seeds straw-colored with grayish blotches, obovoid, 1.5–2 mm. long, with very minute cellular pitting.

Grassy slopes and plains, Upper Sonoran Zone; Oregon (Hornbrook and Kirbyville) to southern California (Los Angeles County). Type locality: California. March–May.

14. *Oenothera heterantha* Nutt. Northern Sun-cup. Fig. 3421.

Oenothera heterantha Nutt. in Torr. & Gray, Fl. N. Amer. 1: 507. 1840.

Oenothera heterantha var. *taraxacifolia* S. Wats. Proc. Amer. Acad. 8: 589. 1873.

Taraxia heterantha Small, Bull. Torrey Club 23: 186. 1896.

Acaulescent perennial, with general habit of the next species, but essentially glabrous, though it may be finely pubescent, especially on the leaf-margins. Leaf-blades lanceolate to ovate-lanceolate, entire or repand-denticulate or sinuate-pinnatifid, especially at base, 3–15 cm. long, narrowed into winged petioles of almost same length; sepals lanceolate, 5–8 mm. long; petals yellow, orbicular-obovate, slightly notched at tip, 8–10 mm. long; stamens unequal; stigma discoid; capsule oblong-ovoid, relatively smooth, coriaceous, persistent, somewhat 4-angled, pointed above, not concealed among leaf-bases, 12–15 mm. long; seeds oblong, straw-colored, 3 mm. long, with minute cellular pitting.

Moist grassy places, Upper Sonoran and Transition Zones; eastern Washington to eastern central California (Tulare County), and Rocky Mountains. Type locality: "towards the sources of the Columbia." May–July.

15. *Oenothera ovata* Nutt. Sun-cup. Fig. 3422.

Oenothera ovata Nutt. in Torr. & Gray, Fl. N. Amer. 1: 507. 1840.

Taraxia ovata Small, Bull. Torrey Club 23: 185. 1896.

Acaulescent biennial or perennial, with thick root from the simple or branched crown of which arise numerous flowers and leaves. Leaves with lanceolate to lance-ovate blades, usually undulate, entire to denticulate or even sinuate, glabrous above, ciliate on margins and on veins below, 3–10 cm. long, with petioles of equal or less length; sterile portion of ovary slender, 5–10 (18) cm. long, glabrous; hypanthium 3 mm. long; sepals glabrate to pubescent, lanceolate to lance-ovate, 7–12 mm. long; petals yellow, obovate to suborbicular, 8–20 mm. long; stamens almost subequal; capsule linear-ovoid, sessile to pedicellate, usually below the surface of the ground, torulose, chartaceous, 1–2 cm. long, tardily dehiscent; seeds relatively few, broadly oblong-ovoid, brownish or yellowish, with a peculiar shaggy cellular pubescence.

Open hillslopes, Upper Sonoran Zone; along the coast from Umpqua Valley, Oregon, to Monterey County, California. Type locality: Monterey. March–June.

16. *Oenothera tanacetifolia* Torr. & Gray. Pinnatifid Sun-cup. Fig. 3423.

Oenothera Nuttallii Torr. & Gray, Fl. N. Amer. 1: 506. 1840. Not Sweet, 1830.

Oenothera tanacetifolia Torr. & Gray, Pacif. R. Rep. 2: 121. pl. 4. 1854.

Taraxia tanacetifolia Piper, Contr. U.S. Nat. Herb. 11: 405. 1906.

Perennial, with thick root and simple or branched crown, glabrate to finely pubescent. Leaves lanceolate in outline, deeply sinuate-pinnatifid, the blades 3–10 cm. long, the numerous segments unequal, acute, entire or toothed, the petioles slender, about as long as blades; sterile portion of ovary pubescent, slender, 2–10 cm. long; hypanthium proper 3 mm. long; sepals lance-ovate, acuminate, pubescent, 7–9 mm. long; petals yellow, aging red, narrowly obovate, 10–15 mm. long; stamens unequal; stigma globular; capsule rarely developed, pubescent, narrowly ovoid, quadrangular, torulose, 17–20 mm. long, 5–6 mm. thick, relatively straight; seeds numerous, brown, oblong, slightly curved, carunculate, finely pitted in longitudinal rows, about 2 mm. long.

Damp grassy places, Upper Sonoran and Transition Zones; eastern Washington to Mono County, California, Idaho, and Nevada. June–July.

17. *Oenothera refracta* S. Wats. Refracted Desert Primrose. Fig. 3424.

Oenothera refracta S. Wats. Proc. Amer. Acad. 17: 373. 1882.

Sphaerostigma refractum Small, Bull. Torrey Club 23: 192. 1896.

Oenothera deserti M. E. Jones, Contr. West. Bot. No. 12: 15. 1908.

Annual, 5–40 cm. tall, erect, with few to several divaricately spreading branches, usually glandular-puberulent and somewhat strigillose throughout, the stems slender, commonly red, with epidermis exfoliating in age. Leaves largest near base of plant, but well distributed up to lowest flowers, oblanceolate to lanceolate to oblong-linear, entire to denticulate, 2–5 cm. long, short-petioled to sessile; inflorescence racemose, sometimes paniculate, 5–15 cm. long; hypanthium 5–6 mm. long; sepals lance-oblong, 5–6 mm. long; petals white, suborbicular, 4–7 mm.



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3409



3410



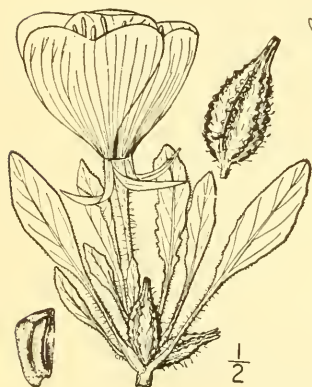
3412



3411



3413



3414



3415

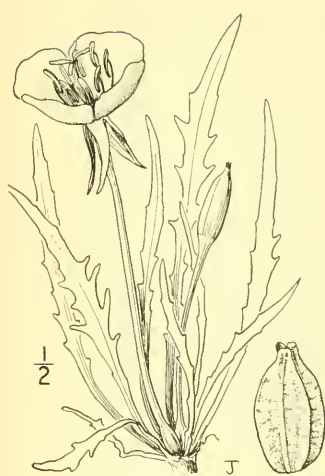


3416

3408. *Oenothera Rydbergii*
 3409. *Oenothera biennis*
 3410. *Oenothera Hookeri*

3411. *Oenothera deltoidea*
 3412. *Oenothera pallida*
 3413. *Oenothera californica*

3414. *Oenothera caespitosa*
 3415. *Oenothera xylocarpa*
 3416. *Oenothera primiveris*



3417



3418



3419



3421



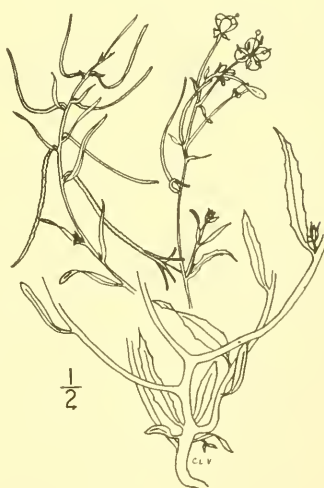
3420



3422



3423



3424



3425

3417. *Oenothera flava*
 3418. *Oenothera leptocarpa*
 3419. *Oenothera Palmeri*

3420. *Oenothera graciliflora*
 3421. *Oenothera heterantha*
 3422. *Oenothera ovata*

3423. *Oenothera tanacetifolia*
 3424. *Oenothera refracta*
 3425. *Oenothera chamaenerioides*

long; stamens somewhat unequal; style exceeding corolla; stigma globose; capsule linear, commonly refracted or spreading and straight or curved, even coiled, 3–5 cm. long, generally not beaked; seeds pale, linear, 1 mm. long.

Open places, Lower Sonoran Zone; deserts from southern California to Arizona and southern Utah. Type locality: near the Colorado River. March–May.

18. *Oenothera chamaenerioides* A. Gray. Willow-herb Primrose. Fig. 3425.

Oenothera chamaenerioides A. Gray, Smiths. Contr. 5^o: 58. 1853.

Sphaerostigma chamaenerioides Small, Bull. Torrey Club 23: 189. 1896.

Sphaerostigma erythrum Davidson, Bull. S. Calif. Acad. 1: 118. pl. 9. 1902.

Erect annual, 1–5 dm. tall, usually branching near the base, the stems slender, often reddish, lower portions glandular-puberulent, upper strigillose and glandular-puberulent. Leaf-blades thin, glabrate, 4–8 cm. long, ovate-lanceolate to lanceolate, entire, with petioles 1–3 cm. long, in inflorescence reduced to linear bracts; inflorescence a corymbose raceme, elongating in fruit to 2 dm.; hypanthium 2.5–3 mm. long; sepals lance-ovate, 2.5 mm. long; petals white, often reddish in age, about 3 mm. long; stamens subequal; capsule terete, linear, divaricately spreading, scarcely if at all beaked, 25–50 mm. long; seeds pale, linear, about 1 mm. thick.

Open places in the desert, Lower Sonoran Zone; southern California to St. George, Utah, and El Paso, Texas. Type locality: near El Paso. March–May.

19. *Oenothera minor* var. *Cusickii* Munz. Cusick's Primrose. Fig. 3426.

Oenothera minor var. *Cusickii* Munz, Bot. Gaz. 85: 240. 1928.

Annual, more or less canescent-strigillose throughout, scarcely if at all glandular, stems simple and erect or usually with several subequal ascending stems, somewhat reddish, slender, 5–30 cm. high, with epidermis only tardily exfoliating. Basal leaves largest, the blades spatulate to oblanceolate to elliptic-ovate, subentire, 5–25 mm. long, with petioles almost as long, upper leaves reduced; flowers borne singly in almost all the leaf-axils, the upper being grouped in a spicate inflorescence; hypanthium 1 mm. long; sepals 1 mm. long; petals yellowish, 1–1.2 mm. long; stamens unequal; capsule 10–25 mm. long, more or less contorted, gradually narrowed from the base, 10–18 mm. long, often beaked; seeds narrowly obovoid, somewhat angled, grayish, 1 mm. long.

Dry slopes, Upper Sonoran Zone; eastern Washington to adjacent Oregon and Idaho. Type locality: Malheur River, Oregon. May–July.

The typical species, with flowers twice the size, ranges to the east from Idaho and Nevada.

20. *Oenothera nevadensis* Kell. Nevada Primrose. Fig. 3427.

Oenothera nevadensis Kell. Proc. Calif. Acad. 2: 224. fig. 70. 1863.

Sphaerostigma nevadense Heller, Muhlenbergia 6: 51. 1910.

Annual, glabrate, forming a simple erect tuft, 2–5 cm. tall, or with several naked prostrate branches 3–10 cm. long with terminal tufts of leaves and flowers. Leaves narrowly oblanceolate, 10–35 mm. long on petioles of about same length; flowers white, diurnal; hypanthium 3 mm. long, sparingly pubescent; the petals 3.5–5 mm. long; capsules 10–12 mm. long, 1.5–2 mm. thick, quadrangular with ridge running along middle of each face, swollen at base, narrowed toward slender beak, coiled and twisted, usually crowded; seeds pale gray, 1 mm. long, linear-obovoid.

Depressions, Upper Sonoran Zone; Washoe and Ormsby Counties, Nevada, and apparently adjacent California. Type locality: not given. May–June.

21. *Oenothera alyssoides* Hook. & Arn. Alyssum-like Primrose. Fig. 3428.

Oenothera alyssoides Hook. & Arn. Bot. Beechey 340. 1838.

Sphaerostigma alyssoides Walp. Rep. 2: 78. 1843.

Sphaerostigma implexum A. Nels. Bot. Gaz. 52: 267. 1911.

Annual, usually branching from base, central stem erect, others ascending and curved at tip, bright green, minutely pubescent, rather slender, 5–35 cm. tall. Leaves bright green, oblanceolate to ovate-lanceolate, 15–40 mm. long, entire or remotely denticulate, the lowermost with petioles of about same length, upper leaves gradually reduced, subsessile; hypanthium 2–3 mm. long, glabrous within; sepals 4–5 mm. long; petals white, often drying yellowish, 4–5 mm. long; stamens unequal; style glabrous, about as long as petals; capsule 15–25 mm. long, thickened at base, gradually attenuate toward beak-like tip, much coiled or only curved seeds pale, linear-obovoid, minutely cellular-pitted.

Dry plains of eastern Oregon and adjacent Idaho. Type locality: "Pine Creek, Snake County." June–July.

Oenothera alyssoides var. *villōsa* S. Wats. Proc. Amer. Acad. 8: 591. 1873. (*Sphaerostigma alyssoides* var. *macrophyllum* Small, Bull. Torrey Club 23: 192. 1896; *Sphaerostigma utahense* Small, op. cit. 191.) Grayish in aspect, with canescent or villous hairs throughout; petals white, often drying pinkish; hypanthium 4–8 mm. long, pubescent within; style pubescent about the base; capsules often merely curved. Dry plains and slopes, Upper Sonoran Zone; east to the Sierra Nevada, California, from Lassen County to Inyo County; east to Utah and northern Arizona. Type locality: near Salt Lake, Utah.

22. *Oenothera decorticans* (Hook. & Arn.) Greene. Shredding Primrose.

Fig. 3429.

Gaura decorticans Hook. & Arn. Bot. Beechey 343. 1838.*Oenothera gauraeflora* Torr. & Gray, Fl. N. Amer. 1: 510. 1840.*Oenothera decorticans* Greene, Fl. Fran. 217. 1891.*Sphaerostigma decorticans* Small, Bull. Torrey Club 23: 191. 1896.

Annual, erect, simple or branching below, with the branches ascending or spreading, glabrous to glabrate below, finely pubescent and often glandular above, with shining straw-colored epidermis which exfoliates readily. Leaves largely near the base, bright green or tinged red, glabrous to finely pubescent, subentire, 2–8 cm. long, with petioles of almost equal length, upper leaves reduced; inflorescence a fairly compact spike, elongating in fruit to as much as 3 dm.; hypanthium 4–6 mm. long; sepals 4–5 mm. long; petals white, 5 mm. long, distinctly longer than wide, reddish only in age; stamens unequal; capsule subfusiform, thickest in lower half, 2 mm. thick, 15–25 mm. long, round in cross section, attenuate into a slender beak, and with simple curve so that the beak spreads away from the stem; seeds ash-colored, linear-obovoid, somewhat angled, minutely pitted, 1 mm. long.

Loose slopes and disturbed places, Upper Sonoran Zone; Monterey County to Los Angeles County, California. Type locality: Monterey. March–June.

Oenothera decorticans var. *rutila* (Davidson) Munz, Bot. Gaz. 85: 245. 1928. (*Oenothera rutila* Davidson, Erythraea 2: 62. 1894.) Rather slender-stemmed, considerably diffused with red; flowers small, petals 3.5–4 mm. long, red, distinctly longer than wide; capsules as in the species. Loose slopes in the mountains about the western end of the Mojave Desert, California. Type locality: San Gabriel Mountains, Los Angeles County.

Oenothera decorticans var. *desertorum* Munz, op. cit. 246. More slender than the species, with whiter epidermis on the stems; capsules more slender, 1–1.5 mm. thick at base, more contorted so that tips turn downward; flowers as in the species, the petals longer than wide. Open slopes and plains, Lower Sonoran Zone; Mojave Desert of California to Palm Springs, California, and to Rhyolite, Nevada. Type locality: ten miles southwest of Garlic Springs, San Bernardino County, California.

Oenothera decorticans var. *condensata* Munz, op. cit. 247. Stems low and thick, usually not over 15–18 cm. tall, and with pure white epidermis; petals 4–5 mm. long, suborbicular; capsules woody, much thickened, about 3 mm. at base, quadrangular, and with supplementary ridge down middle of each face. Open plains, deserts of Lower Sonoran Zone; eastern half of the Mojave Desert and the Colorado Desert of California to St. George, Utah. Type locality: Dos Palms Springs, Riverside County, California.

23. *Oenothera Boothii* Dougl. Booth's Primrose. Fig. 3430.*Oenothera Boothii* Dougl. ex Hook. Fl. Bor. Amer. 1: 213. 1834.*Sphaerostigma Boothii* Walp. Rep. 2: 77. 1843.*Sphaerostigma Lemmonii* A. Nels. Bot. Gaz. 40: 61. 1905.

Annual, glandular-pubescent to glandular-villous throughout, erect, 1–4 dm. tall, usually with central stem more prominent than the branches which may spread widely. Leaves ovate to oblong-ovate, fairly evenly distributed, subentire, 2–5 cm. long, with petioles 1–3 cm. additional; inflorescence racemose-spicate, often quite congested, elongating in fruit; hypanthium 4–8 mm. long; sepals 3–7 mm. long; petals white, pinkish in age, obovate, clawed, 3.5–9 mm. long; stamens subequal; capsule 10–15 mm. long, usually ascending in lower half and with terminal portion spreading but not contorted, thickest near base, 1.5–2 mm. wide; seeds brown, rhomboid-prismatic, minutely cellular-pubescent, 1 mm. long, gray when immature.

Dry plains and slopes, mostly in Upper Sonoran Zone; from Walla Walla region, Washington, to eastern California and Utah and Arizona. Type locality: "on the high sandy and gravelly hills of Lewis and Clark's River." June–Aug.

Oenothera Boothii var. *pygmaea* (Dougl.) Torr. & Gray, Fl. N. Amer. 1: 510. 1840. (*Oenothera pygmaea* Dougl. ex Lehm. in Fl. Bor. Amer. 1: 213. 1834.) Flowers small, hypanthium 1.5–2.5 mm. long; sepals 1.5–2.5 mm. long; petals narrowly obovate, 1.5–2.5 mm. long. Similar situations, Upper Sonoran Zone; eastern Washington and Oregon. Type locality: "near the branches of Lewis and Clark's River, lat. 46° north."

24. *Oenothera andina* Nutt. Plateau Primrose. Fig. 3431.*Oenothera andina* Nutt. in Torr. & Gray, Fl. N. Amer. 1: 512. 1840.*Sphaerostigma andinum* Walp. Rep. 2: 79. 1843.

Low, erect, very slender-stemmed annuals, with spreading branches from near the base or above, finely canescent throughout, 2–15 cm. tall and about as broad, lower stem and branches, in all except the smaller plants, rather free of leaves. Leaves alternate, linear to narrowly oblanceolate, entire, with short indistinct petioles; flowers axillary in a rather crowded corymb which becomes racemose in fruit; hypanthium 1 mm. long; sepals 1.5 mm. long; petals yellow, 1.5 mm. long; stamens unequal; capsule 5–6 mm. long, fusiform, somewhat quadrangular; seeds fusiform, smooth, brown, 0.7 mm. long.

Dried depressions, plains, Upper Sonoran Zone; eastern Washington to northeastern California, Assiniboia, and Utah. Type locality: "Dry plains in the Rocky Mountains, near the Black-Foot River." May–July.

Oenothera andina var. *Hilgardii* (Greene) Munz, Bot. Gaz. 85: 251. 1928. (*Oenothera Hilgardii* Greene, Bull. Torrey Club 10: 41. 1883; *Sphaerostigma andinum* var. *Hilgardii* A. Nels. Bot. Gaz. 40: 56. 1905.) Flowers larger; hypanthium 1.5 mm. long; sepals 2 mm.; petals 2.5 mm. long, broader; capsules 7–9 mm. In similar situations, eastern Washington. Type locality: "moist alkaline soil of Klickitat Swale, Washington."

Oenothera andina f. *tripetala* Lévl. Mon. Onoth. 182. 1905. (*Oenothera andina* var. *anomala* M. E. Peck, Torreya 32: 151. 1932.) Like the species, but flowers trimerous and capsules somewhat 3-sided. Occasional with species especially in eastern Klamath and western Lake Counties, Oregon. Type locality: not given.

25. *Oenothera contorta* Dougl. Contorted Primrose. Fig. 3432.

Oenothera contorta Dougl. ex Hook. Fl. Bor. Amer. 1: 214. 1834.

Sphaerostigma contortum Walp. Rep. 2: 78. 1843.

Annual, slender-stemmed, 5–10, occasionally 25 cm. tall, glabrate to finely pubescent, usually with several to few suberect branches from near the base. Leaves well distributed, linear to lance-linear, not over 2 mm. wide, 5–25 mm. long, subsessile, the lower ones frequently with fascicles of smaller leaves in the axils, upper leaves reduced to leafy bracts; hypanthium 1–2 mm. long, glabrate to strigillose or glandular without; sepals lance-ovate, 1.5–2.5 mm. long; petals bright yellow, aging red, narrowly obovate to obcordate, 2.5–3 mm. long; stamens unequal; capsules linear, cylindrical, often torulose, sessile, curved or straight, 25–35 mm. long, ending in a definite beak; seeds brown, obovoid, less than 1 mm. long, minutely cellular-pitted.

Dry loose slopes, recently disturbed places, sandy areas, etc., Upper Sonoran Zone; eastern British Columbia to Modoc County, California, and western Nevada. Type locality: "on sandy barren soils of the interior parts of the Columbia River." April–July.

Oenothera contorta var. *flexuosa* (A. Nels.) Munz, Bot. Gaz. 85: 253. 1928. (*Sphaerostigma contortum* var. *flexuosum* A. Nels. Bot. Gaz. 40: 58. 1905; *Oenothera parvula* Nutt. in Torr. & Gray, Fl. N. Amer. 1: 511. 1840; *Sphaerostigma filiforme* A. Nels. op. cit. 57.) Stems and leaves as in the species; capsules more slender, distinctly pedicelled, not beaked, 17–25 mm. long, frequently curved into a half circle. Ranging with the species, but extending farther south (Inyo County, California) and east (Wyoming and Utah). Type locality: Point of Rocks, Wyoming.

Oenothera contorta var. *pubens* (S. Wats.) Coville, Contr. U.S. Nat. Herb. 4: 104. 1893. (*Oenothera strigulosa* var. *pubens* S. Wats. Proc. Amer. Acad. 8: 594. 1873; *Sphaerostigma orthocarpum* Nels. & Kenn. Proc. Biol. Soc. Wash. 19: 155. 1906.) Coarse-stemmed plants with abundant spreading pubescence; leaves rather broad, commonly over 2 mm. wide; capsules 1 mm. or more in diameter, 25–35 mm. long, sessile or subsessile, not beaked. Eastern middle California and western Nevada. Type locality: Carson City, Nevada.

Oenothera contorta var. *strigulosa* (Fisch. & Mey.) Munz, Bot. Gaz. 85: 255. 1928. (*Sphaerostigma strigosum* Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 50. 1835.) Stems densely pubescent, with short appressed or incurved hairs, and growing to be 15–30 cm. tall; capsules short, 15–25 mm. long, not beaked. Sandy soils, upper Transition and Sonoran Zones; along the coast from Humboldt County to Monterey County, California. Type locality: "Nova California."

Oenothera contorta var. *epilobioides* (Greene) Munz, op. cit. 256. Large, commonly 25–40 cm. tall, erect; stems mostly glabrate, but if pubescent, the hair is spreading (especially in plants from central California); inflorescence often glandular; capsules 25–40 mm. long, sessile, slender, commonly beaked. Upper Sonoran Zone; cismontane region from southern Oregon to northern Lower California. Also in Chile. Type locality: not given.

26. *Oenothera dentata* var. *campéstris* (Greene) Jepson. Field Primrose. Fig. 3433.

Oenothera campestris Greene, Fl. Fran. 216. 1891.

Sphaerostigma campestre Small, Bull. Torrey Club 23: 189. 1896.

Oenothera dentata var. *campestris* Jepson, Man. Fl. Pl. Calif. 685. 1925.

Annual, usually bushy, freely branched from base, stems subdecumbent to ascending, occasionally subsimple and erect, slender, even capillary, 5–20 cm. tall, with light-colored epidermis tending to exfoliate with age, short-villous below with spreading hair; inflorescence glandular. Leaves well distributed, mostly lance-linear, subsessile, often fascicled, pubescent to glabrous, remotely denticulate, 5–35 mm. long, gradually reduced up the stem to the leafy bracts of the inflorescence; flowers few, not crowded; hypanthium 2–4 mm. long; sepals lance-ovate, 3–6 mm. long; petals bright yellow, with or without red dots at base, suborbicular to obovate to obcordate, 5–8 mm. long; stamens unequal; capsule linear, terete, somewhat torulose, straight or somewhat contorted, strigillose or glabrate, 2–4 cm. long, slender, 0.5 mm. thick at base, usually with well-defined beak; seeds brown, linear-obovoid, somewhat angled and flattened, minutely cellular-punctate, 0.5 mm. long.

Dry sandy plains, Upper Sonoran Zone; Great Valley of California and sparingly in the interior valleys of the coastal counties from Antioch to Santa Barbara. Type locality: California. April–June. *Oenothera dentata* Cav. was described from Chile and closely resembles our plant.

Oenothera dentata var. *Parishii* (Abrams) Munz, Bot. Gaz. 85: 259. 1928. (*Sphaerostigma campestre* var. *Parishii* Abrams, Fl. Los Ang. 272. 1904.) Stems glabrate or with short appressed hair; inflorescence usually canescent, sometimes glandular; flowers as in preceding variety; capsules slender, 0.5 mm. thick, not distinctly beaked; seeds 0.5 mm. long. Upper Sonoran and high Lower Sonoran Zones; California, in western half of Mojave Desert and occasional in interior valleys of cismontane California from Santa Barbara County to Riverside County. Type locality: San Bernardino.

Oenothera dentata var. *Johnstonii* Munz, loc. cit. Stems glabrate or glandular-pubescent; inflorescence glandular-pubescent. Leaves up to 6 mm. wide; flowers larger, sepals 5–12 mm. long; petals 10–16 mm. long; capsule 1 mm. thick, not conspicuously beaked; seeds 1 mm. long. Upper and Lower Sonoran Zones, western half of Mojave Desert, California, eastward into Nevada. Type locality: near Mojave, California.

Oenothera dentata var. *Gilmánii* Munz, Leaflets West. Bot. 2: 87. 1938. Whole plant viscid with short spreading gland-tipped hairs. Death Valley, California, the type locality.

27. *Oenothera micrantha* Hornem. Small Primrose. Fig. 3434.

Oenothera hirta Link, Enum. Hort. Ber. 1: 378. 1821. Not *O. hirta* L.

Oenothera micrantha Hornem. ex Spreng. Syst. 2: 228. 1825.

Sphaerostigma micranthum Walp. Rep. 2: 77. 1843.

Annual, simple or several-stemmed, prostrate, hirsute, 5–50 cm. long, leafy throughout, with readily exfoliating epidermis. Basal leaves forming a sort of rosette, linear-lanceolate to oblanceolate, almost entire, 2–10 cm. long with equal or longer petioles; cauline leaves shorter, oblong-lanceolate, sessile, obtuse, undulate, denticulate, commonly 5–7 mm. wide; flowers small, petals yellow, often drying green, 2–4 mm. long; stamens unequal; capsules curved or contorted, quad-



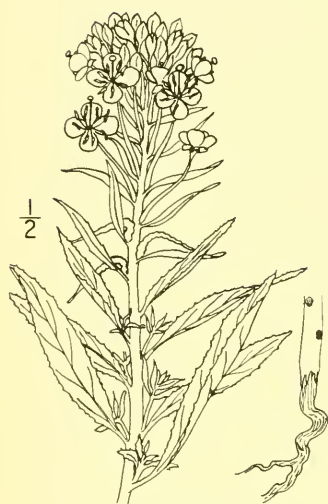
3426



3427



3428



3429



3430



3431



3432



3433



3434

3426. *Oenothera minor*
 3427. *Oenothera nevadensis*
 3428. *Oenothera alyssoides*

3429. *Oenothera decorticans*
 3430. *Oenothera Boothii*
 3431. *Oenothera andina*

3432. *Oenothera contorta*
 3433. *Oenothera dentata*
 3434. *Oenothera micrantha*

angular, 12–20 mm. long, gradually attenuate toward apex and generally beaked; seeds brown, obovoid, finely cellular-pitted, 1 mm. long.

Dry slopes and valleys, especially in sandy and disturbed places, Upper Sonoran Zone; along the coast, Bodega Point, California, to Lower California. Type locality: California. March–May.

Oenothera micrantha var. *Jónessii* (Lévl.) Munz, Amer. Journ. Bot. 19: 778. 1932. (*Oenothera hirta* var. *Jonesii* Lévl. Mon. Onoth. 213. 1905; *Oenothera hirtella* Greene, Fl. Fran. 215. 1891; *Sphaerostigma arenicolum* A. Nels. Bot. Gaz. 40: 58. 1905.) Erect or ascending, densely villous-pubescent throughout; cauline leaves oblong-ovate to broadly ovate, acute, often sessile, with subordinate clasping base; flowers small as in the species. Similar situations, but mostly on the hills and mountain bases of the interior valleys, northern California to Lower California. Type locality: Santa Cruz, Santa Cruz County.

Oenothera micrantha var. *ignota* Jepson, Man. Fl. Pl. Calif. 684. 1925. (*Oenothera hirta* var. *ignota* Munz, Bot. Gaz. 85: 263. 1928.) Glabrate stems simple, erect; calyx glabrate; flowers larger; petals 5–7 mm. long. Dry valleys and hills, in the interior, Kern and Madera Counties, California, to northern Lower California. Type locality: Riverside County.

Oenothera micrantha var. *exfoliata* (A. Nels.) Munz, Amer. Journ. Bot. 19: 778. 1932. (*Sphaerostigma micranthum* var. *exfoliatum* A. Nels. Bot. Gaz. 40: 59. 1905; *Oenothera Abramsii* J. F. Macbride, Contr. Gray Herb. No. 65: 41. 1922; *Oenothera micrantha* var. *Abramsii* Jepson, Man. Fl. Pl. Calif. 685. 1925.) Plant pallid with dense whitish pubescence; stems usually several from near the base, spreading; flowers rather large; petals 3–6 mm. long. Dry slopes and plains, Upper and Lower Sonoran Zones; deserts of southern California and western Arizona. Type locality: Colorado Desert, California.

Oenothera guadalupensis S. Wats. Proc. Amer. Acad. 11: 115. 1876. Much like *Oenothera micrantha*, but with oblong-pyramidal capsules 12 mm. long, 2.5 mm. thick and scarcely if at all curved. Sand dunes, San Clemente Island, California, and Guadalupe Island, Lower California, the type locality.

28. *Oenothera bistorta* Nutt. Southern Sun-cup. Fig. 3435.

Oenothera bistorta Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 508. 1840.

Sphaerostigma bistorta Walp. Rep. 2: 77. 1843.

Annual, occasionally simple, but usually with several prostrate or ascending stems, these villous, light green, often tinged reddish, with exfoliating epidermis, rather slender, 5–80 cm. long. Leaves green, pubescent to pilose, denticulate to subentire, those of the basal rosette 3–7 cm. long, linear-oblancoolate, narrowed into petioles 1–4 cm. long; cauline leaves often second, shorter and wider, the uppermost subsessile to cordate-clasping; flowers in leaf-axils, only a few in anthesis at once; hypanthium 3–5 mm. long; sepals 7–10 mm. long; corolla yellow, often drying greenish, with or without dark spot at base, 8–14 mm. long; stamens unequal; capsule curved or contorted, 2–2.5 mm. thick, 12–15 mm. long, sharply quadrangular, with beak lacking or not more than 4–5 mm. long; seeds brown, obovoid, 1 mm. long, finely cellular-pitted.

Dry slopes, sea bluffs, Upper Sonoran Zone; largely about San Diego, occasional as far north as Los Angeles County, California. Type locality: San Diego. March–May.

Oenothera bistorta var. *Veitchiana* Hook. Bot. Mag. 84: pl. 5078. 1858. (*Sphaerostigma Veitchianum* Small, Bull. Torrey Club 23: 191. 1896.) Capsule more slender, 1.5–2 mm. thick, and longer, 20–40 mm., with the beak 3–10 or more mm. long. Dry slopes and valleys, Upper Sonoran Zone; largely in the interior of cismontane southern California. Much more common than the species. Type locality: near San Gabriel, Los Angeles County.

Oenothera bistorta var. *Hallii* (Davidson) Jepson, Man. Fl. Pl. Calif. 685. 1925. (*Sphaerostigma Hallii* Davidson, Muhlenbergia 3: 107. 1907.) Foliage pallid with short appressed hair. Dry slopes and plains about the western edge of the Colorado Desert, southern California. Type locality: Banning, Riverside County.

29. *Oenothera cheiranthifolia* Hornem. Beach Primrose. Fig. 3436.

Oenothera cheiranthifolia Hornem. ex Spreng. Syst. 2: 228. 1825.

Oenothera spiralis Hook. Fl. Bor. Amer. 1: 213. 1833.

Sphaerostigma spirale Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 50. 1835.

Perennial, apparently flowering first year, with several prostrate to decumbent wiry stems radiating from a central rosette crowning the taproot, these 1–6 dm. long; plant grayish pubescent throughout. Leaves thick, those of rosette oblanceolate, 1–7 cm. long, obtuse, narrowed into petioles 1–2 cm. long; lower cauline leaves lance-oblong, subsessile to short-petioled, obtuse, subentire, 2–4 cm. long, the upper ones still shorter and broader, oblong-ovate to orbicular-ovate; flowers single in axils, mostly not near the base of the stems; hypanthium 2.5–5 mm. long; sepals lanceolate, 4–10 mm. long; petals bright yellow, with or without reddish spots at base, usually drying green, often red, 5–9 mm. long; stamens unequal; capsule coiled, distinctly quadrangular, short-beaked or not at all beaked, pubescent, 12–22 mm. long; seeds dark brown, obovoid, 1 mm. long, minutely cellular-pitted.

Sea beaches, Upper Sonoran and Transition Zones; Coos County, Oregon, to Santa Barbara County, California. Type locality: California. April–July.

Oenothera cheiranthifolia var. *suffruticosa* S. Wats. Proc. Amer. Acad. 8: 592. 1873. (*Oenothera viridescens* Hook. Fl. Bor. Amer. 1: 592. 1833; *Oenothera spiralis* var. *viridescens* Jepson, Man. Fl. Pl. Calif. 684. 1925; *Sphaerostigma spirale* var. *clypeatum* A. Nels. Bot. Gaz. 40: 60. 1905.) Foliage silvery; perennial and usually suffrutescent; flowers large; petals 13–22 mm. long. Sea beaches, Upper Sonoran Zone; Santa Barbara, California, to northern Lower California. Type locality: California. Collected by Coulter.

Oenothera cheiranthifolia var. *nitida* (Greene) Munz, Bot. Gaz. 85: 269. 1928. (*Oenothera nitida* Greene, Pittonia 1: 70. 1887; *Oenothera spiralis* var. *nitida* Jepson, Man. Fl. Pl. Calif. 684. 1925.) Flowers like those of the species itself, with petals 5–8 mm. long; the plants glabrous and green throughout. Sea beaches, rare, Upper Sonoran Zone, Monterey to San Miguel Island, California. Type locality: San Miguel Island.

30. *Oenothera pterospérma* S. Wats. Wing-seeded Primrose. Fig. 3437.

Oenothera pterospérma S. Wats. Bot. King Expl. 112. pl. 14. 1871.

Chylismia pterospérma Small, Bull. Torrey Club 23: 193. 1896.

Sphaerostigma pterospérma A. Nels. Bot. Gaz. 40: 63. 1905.

Annual, low, 5–12 cm. tall, erect, simple or with few open branches; stem slender, pilose below, finely glandular above. Leaves oblong- to ovate-lanceolate, often with a "shoulder" on

each side the tip, entire, sessile or nearly so, 5–20 mm. long; flowers axillary, pinkish white; pedicels 5–8 mm. long, capillary; hypanthium 1.2 mm. long; sepals 1.5–2.5 mm. long; petals obcordate, equalling sepals; stamens unequal; capsules cylindric-clavate, slightly curved, erect, 10–16 mm. long, attenuate at base; seeds oblong, 1.5 mm. long, brownish, flattened, bordered with a revolute, wing-like margin which is “minutely tubercled with cellular processes.”

Rare, dry places, Upper Sonoran Zone; Harper Ranch, eastern Oregon, to Inyo County, California, and Utah. Type locality: foothills, Trinity Mountains, northwestern Nevada. May–June.

31. *Oenothera cardiophylla* Torr. Heart-leaved Primrose. Fig. 3438.

Oenothera cardiophylla Torrey, Pacif. R. Rep. 5: 360. 1858.

Oenothera cardiophylla var. *petiolaris* M. E. Jones, Proc. Calif. Acad. II. 5: 682. 1895.

Chylismia cardiophylla Small, Bull. Torrey Club 23: 193. 1896.

Annual to suffrutescent perennial, 1–5 dm. tall, erect, usually freely branched, occasionally simple, typically soft-pubescent throughout, but varying from glabrate to white-villous, the stems fairly coarse. Leaves orbicular-cordate to ovate, irregularly dentate or denticulate, obtuse, somewhat bicolorated, subglabrate to white-villous, well distributed, 1–6 cm. long, almost as wide, on petioles 1–7 cm. long; flowers borne singly in axils of reduced upper leaves or more commonly in dense terminal racemes; hypanthium 5–10 mm. long; sepals ovate, 3–7 mm. long; petals a clear yellow, turning red with age, broader than long, 6–8 mm. long; stamens unequal; capsules rather coarse, cylindrical, usually slightly curved, 2–6 cm. long, on pedicels 2–10 mm. long; seeds obovoid, brown, somewhat irregularly angled, 0.6 mm. long.

Desert mesas and canyons, Lower Sonoran Zone; Inyo County, California, to northern Lower California and western Arizona. Type locality: near Yuma, Arizona. March–May.

Oenothera cardiophylla var. *splendens* Munz & Jtn. Bull. Torrey Club 49: 354. 1923. (*Oenothera cardiophylla* var. *longistylis* Jepson, Man. Fl. Pl. Calif. 686. 1925.) Flowers larger, hypanthium 20–35 mm. long; petals 13–25 mm. long. With the species but more restricted in range, from Needles, California, to Yuma, Arizona. Type locality: Needles, San Bernardino County, California.

32. *Oenothera kernensis* Munz. Kern County Evening Primrose. Fig. 3439.

Oenothera kernensis Munz, Amer. Journ. Bot. 18: 737. 1931.

Annual, erect, with few spreading branches from the base, 8–12 cm. tall, somewhat canescent throughout, minutely glandular-pubescent in inflorescence. Leaves well distributed, the basal ones oblanceolate, 10–15 mm. long, 3–5 mm. wide, almost sessile, obtuse or acute, subentire or denticulate; cauline leaves somewhat reduced, lance-linear; flowers few, solitary in upper axils in a lax raceme; hypanthium 2–3 mm. long; sepals lanceolate, reflexed, 5–6 mm. long; petals bright yellow, obovate, 1 cm. long; stamens of two lengths; stigma globose; capsule ascending, somewhat curved, cylindric-clavate, 2–2.5 cm. long, 1–1.5 mm. thick, not beaked, pubescent, on a pedicel 4–6 mm. long.

Dry slopes, at 4,000–5,000 feet, Upper Sonoran Zone; east side of Walker Pass, the type locality, Kern County, California. May.

33. *Oenothera brevipes* A. Gray. Desert Primrose. Fig. 3440.

Oenothera brevipes A. Gray, Pacif. R. Rep. 4: 87. 1857.

Chylismia brevipes Small, Bull. Torrey Club 23: 194. 1896.

Annual, frequently rather coarse, usually 1- to few-stemmed from base, occasionally branched above, spreading-villous, especially below, 1–4 dm. tall, erect with nodding stem-tips. Leaves largely in basal rosettes with few scattering smaller ones on lower stem, the uppermost reduced to bracts, lower ones petioled, glabrate to villous, usually bicolorated, with conspicuous reddish veins beneath, ovate to oblong-cordate, subentire to pinnate or pinnatifid; inflorescence racemose; pedicels short, 3–15 mm. long; hypanthium 3–7 mm. long; sepals 6–10 mm. long, pilose and glandular; petals bright yellow, obovate, 7–15 mm. long; stamens subequal, the anthers with scattered hairs; capsule linear, spreading-divaricate, 5–9 cm. long, 2–3 mm. in diameter; seeds straw-colored, obovoid, 1–1.5 mm. long, somewhat angled.

Open deserts, Lower Sonoran Zone; southern California to adjacent Arizona and Nevada. Type locality: Colorado River. March–May.

Oenothera pallidula Munz, Leaflets West. Bot. 2: 88. 1938. (*Oenothera brevipes* var. *pallidula* Munz, Amer. Journ. Bot. 15: 229. 1928.) Like *Oenothera brevipes*, but with no spreading hairs, the stems glabrate to finely canescent; sepals glandular-pubescent to canescent; capsules 1–1.5 mm. in diameter. Death Valley to Riverside County, California, eastward to Utah. Type locality: Las Vegas, Nevada.

34. *Oenothera multijuga* var. *parviflora* (S. Wats.) Munz. Pinnate-leaved Primrose. Fig. 3441.

Oenothera brevipes var. *parviflora* S. Wats. ex Parry, Amer. Nat. 9: 271. 1875.

Chylismia parviflora Rydb. Fl. Rocky Mts. 603, 1064. 1917.

Oenothera scapiodea var. *tortilis* Jepson, Man. Fl. Pl. Calif. 687. 1925.

Oenothera multijuga var. *parviflora* Munz, Amer. Journ. Bot. 15: 231. 1928.

Annual, glabrate to closely fine-pubescent or villous, slender, 1-stemmed and erect, or branched especially above, 2–8 dm. tall. Leaves in a basal rosette, pinnate with 5–8 pairs of major lateral pinnae and a larger terminal one, usually quite villous, and with conspicuous reddish veins beneath; upper parts of plant quite leafless; the inflorescence of naked racemes which may be in a loose open panicle; pedicels capillary, 1–2 cm. long; sepals 3–4 mm. long; petals

yellow, 3–5 mm. long; stamens unequal; capsules linear, slender, 1–1.5 mm. in diameter, 15–25 mm. long; seeds numerous, light brown, obovoid, 1 mm. long.

Dry slopes and washes, Lower Sonoran Zone; Death Valley region, eastern California to Utah and Arizona. Type locality: Valley of the Virgin, near St. George, Utah. March–May. Differing from *Oenothera multijuga* S. Wats. by having flowers about half as large, the species proper not entering California.

35. *Oenothera scapoidea* var. *seorsa* (A. Nels.) Munz. Scapoid Primrose.

Fig. 3442.

Chylismia scapoidea var. *seorsa* A. Nels. Bot. Gaz. 54: 140. 1912.

Oenothera scapoidea var. *seorsa* Munz, Amer. Journ. Bot. 15: 233. 1928.

Annual, simple or branching from base, erect or spreading, glabrate below, glandular-pubescent above, 1–4 dm. tall, the stems quite simple above. Leaves mostly in lower part of plant, preavillingly simple, ovate to oblong-ovate, the blades 1–4 cm. long, with petioles somewhat longer; upper leaves much reduced; inflorescence mostly racemose; pedicels capillary, 5–15 mm. long; hypanthium 1.5–3 mm. long; sepals 2 mm. long; petals yellow, 2–3 mm. long; stamens unequal; capsules quite erect, clavate, slightly curved, 10–25 mm. long, 2–2.5 mm. thick; seeds brownish, obovoid, 1.5–2 mm. long.

Dry mesas and in disturbed areas, Upper Sonoran Zone; Baker County, Oregon, and Inyo County, California, to Wyoming and Colorado. Type locality: Evanston, Wyoming. May–June. Differing from the species, which does not enter our range, by its glandular pubescence.

36. *Oenothera clavaeformis* Torr. & Frem. Clavate-fruited Primrose. Fig. 3443.

Oenothera clavaeformis Torr. & Frem. in Frem. Second Rep. 314. 1845.

Oenothera scapoidea var. *clavaeformis* S. Wats. Bot. King Expl. 109. 1871.

Chylismia clavaeformis Heller, Muhlenbergia 2: 105. 1906.

Annual, simple or with few unbranched stems from the base, 1–4 dm. tall, glabrate to finely pubescent below, glabrate about the inflorescence. Leaves mostly in a basal rosette, simple and irregularly dentate, with ovate blades 2–5 cm. long and petioles of same length, rarely pinnatifid; cauline leaves much reduced; inflorescence racemose, somewhat peduncled, the flowers quite crowded in anthesis, pedicels 8–25 mm. long; hypanthium and sepals glabrous, each about 5 mm. long; petals white, often drying reddish, 4–6 mm. long; the corolla often reddish brown at base; stamens almost equal, the anthers with white spreading hairs; capsule clavate, commonly about 2 mm. thick, 12–20 mm. long, generally curved and ascending; seeds light brown, obovoid, somewhat angled, 1.2 mm. long.

Dry plains, high Lower Sonoran and Upper Sonoran Zones; western half of Mojave Desert of California to Inyo County, east to central Nevada. Type locality: Mojave Desert. March–May (June).

Oenothera clavaeformis var. *aurantiaca* (S. Wats.) Munz, Amer. Journ. Bot. 15: 237. 1928. (*Oenothera scapoidea* var. *aurantiaca* S. Wats. Proc. Amer. Acad. 8: 595. 1873.) Stems glabrate to finely pubescent; flowers like those of the species, mostly whitish and often drying purplish, but sometimes a pale yellow when fresh; sepals and inflorescence finely strigillose-pubescent; leaves tending to be much pinnate. Open desert, Lower Sonoran Zone; California (Death Valley region to Colorado Desert) to St. George, Utah. Type locality: Fort Mohave, Arizona.

Oenothera clavaeformis var. *purpurascens* (S. Wats.) Munz, Leaflets West. Bot. 3: 53. 1941. (*Oenothera cruciformis* Kell. Proc. Calif. Acad. 2: 227. fig. 71. 1863; *Chylismia scapoidea* var. *cruciformis* Small, Bull. Torrey Club 23: 193. 1896; *Oenothera scapoidea* var. *purpurascens* S. Wats. Proc. Amer. Acad. 8: 595. 1873; *Chylismia lancifolia* Heller, Muhlenbergia 2: 226. 1906.) Stems closely and finely canescent-pubescent; flowers clear yellow or with reddish spots; leaves scarcely or not at all pinnatifid. Loose dry slopes and disturbed areas, Upper Sonoran Zone; eastern Oregon to Inyo County, California, and Washoe County, Nevada. Type locality: Mono Lake, Mono County, California.

Oenothera clavaeformis var. *Peirsonii* Munz, Amer. Journ. Bot. 15: 238. 1928. Stems spreading-vilous; leaves often much divided; flowers yellowish. Dry sandy plains, Lower Sonoran Zone, deserts of northern Lower California and Imperial and Riverside Counties, California. Type locality: Imperial County.

37. *Oenothera heterochroma* S. Wats. Shockley's Primrose. Fig. 3444.

Oenothera heterochroma S. Wats. Proc. Amer. Acad. 17: 373. 1882.

Chylismia heterochroma Small, Bull. Torrey Club 23: 193. 1896.

Annual, simple or branched at base, branching above, glandular-pubescent throughout, 25–50 cm. tall. Leaves in lower portion only, but not actually in basal rosette, ovate, irregularly serrate, with fairly conspicuous veins beneath, villous, 2–6 cm. long, on petioles almost as long; upper leaves reduced; pedicels capillary, 2–5 mm. long; hypanthium 2.5 mm. long; sepals the same; petals purplish, 3–5 mm. long; stamens unequal; capsule 8–13 mm. long, 2 mm. thick, clavate; seeds brown, obovoid, 1 mm. long.

Rare, dry places, Upper Sonoran Zone; known in California only from Crooked Creek, Owens Valley; occasional in western Nevada. Type locality: Candelaria, Nevada. Aug.–Sept.

Oenothera heterochroma var. *monoensis* Munz, El Aliso 2: 84. 1949. Stems subglabrous, somewhat glaucous. Dry slopes and fans, Upper Sonoran Zone, Mono and Inyo Counties, California. Type locality: Sherwin Grade, north of Bishop, California.

9. *GAYOPHYTUM* Juss. Ann. Sci. Nat. 25: 18. pl. 4. 1832.

Slender caulescent annuals. Leaves alternate, entire, linear and subsessile, or lowest may be opposite and linear-oblongulate and short-petioled. Flowers in upper axils. Hypanthium not prolonged beyond the ovary. Sepals 4, usually reflexed in anthesis. Petals 4, small, rhomboid-spatulate to -obovate, white, frequently drying pink or red. Stamens 8,



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3435. *Oenothera bistorta*3436. *Oenothera cheiranthifolia*3437. *Oenothera pterosperma*3438. *Oenothera cardiophylla*3439. *Oenothera kernensis*3440. *Oenothera brevipes*3441. *Oenothera multijuga*3442. *Oenothera scapoidea*3443. *Oenothera clavaeformis*

the alternate set much reduced and usually sterile. Stigma capitate. Capsule 2-celled, 4-valved, linear or clavate. Seeds many, in a single row in each cell, not comose. [Name in honor of Gay, author of Flora of Chile, and Greek word for plant.]

A genus of 9 species of the temperate regions of western North and South America. Type species, *Gayophytum humile* Juss.

Capsule torulose, pedicelled; plants freely branched above the base, repeatedly dichotomous, the upper leaves bract-like.

Seeds glabrous.

Petals 0.5–1.5 mm. long.

Petals 0.5 mm. long; capsule 2–5 mm. long, shorter than the deflexed pedicel; plants quite glabrous.

1. *G. ramosissimum*.

Petals 1–1.5 mm. long; capsule 5–12 mm. long, exceeding the pedicel.

2. *G. Nuttallii*.

Petals 2–4 mm. long.

3. *G. diffusum*.

Seeds appressed-canescens.

Petals 1–2 mm. long.

4. *G. lasiospermum*.

Petals 3–4 mm. long.

5. *G. eriospermum*.

Capsule not torulose, subsessile; plants branched mostly at the base, not so much above; upper leaves quite well developed.

Seeds vertically placed in a very narrow capsule.

Seeds glabrous.

6. *G. racemosum*.

Seeds appressed-canescens.

7. *G. Helleri*.

Seeds obliquely placed in a slightly broader capsule.

8. *G. humile*.

1. *Gayophytum ramosissimum* Torr. & Gray. Much-branched *Gayophytum*. Fig. 3445.

Gayophytum ramosissimum Torr. & Gray, Fl. N. Amer. 1: 513. 1840.

Gayophytum ramosissimum var. *deflexum* Hook. Lond. Journ. Bot. 6: 224. 1847.

Gayophytum ramosissimum var. *obtusum* Jepson, Man. Fl. Pl. Calif. 688. 1925.

Diffusely branched, mostly above the base, with the ultimate branches filiform, quite glabrous, sometimes slightly strigillose about the flowers; plant 2–5 dm. tall. Leaves lance-linear, 1–3 cm. long, short-petioled, gradually reduced up the stem; pedicels capillary, 3–5 mm. long, mostly spreading-deflexed; flowers minute; sepals erect, 0.5 mm. long; petals 0.5 mm. long; stigma globose; capsule plump, 2–5 mm. long; seeds glabrous, 0.6 mm. long.

Dry slopes and ridges, Upper Sonoran and Transition Zones; from eastern Washington and Oregon to northeastern California, Wyoming, Utah, and northern Arizona. Type locality: "Rocky Mountains," Blackfoot River. June–Aug.

2. *Gayophytum Nuttallii* Torr. & Gray. Nuttall's *Gayophytum*. Fig. 3446.

Gayophytum Nuttallii Torr. & Gray, Fl. N. Amer. 1: 514. 1840.

Gayophytum ramosissimum var. *strictipes* Hook. Lond. Journ. Bot. 6: 224. 1847.

Gayophytum ramosissimum var. *pygmaeum* Jepson, Man. Fl. Pl. Calif. 689. 1925.

With habit and stature of *G. ramosissimum*, usually more evidently strigillose in the upper parts; pedicels 1–3, rarely 5 mm. long, erect; sepals 1–1.5 mm. long, reflexed in anthesis; petals reddish, at least in age, 1–1.5 mm. long; capsules 5–12 mm. long, erect, usually exceeding the pedicels; seeds glabrous, 1–1.5 mm. long.

Dry slopes and ridges, Upper Sonoran and Transition Zones; Washington to southern California, Dakota, and New Mexico; Chile and Argentina. Type locality: "Rocky Mountains," June–Aug.

Gayophytum Nuttallii var. *intermedium* (Rydb.) Munz, Amer. Journ. Bot. 19: 772. 1932. (*Gayophytum intermedium* Rydb. Bull. Torrey Club 31: 569. 1904.) Puberulence appressed; pedicels and fruit spreading or deflexed. Transition Zone, eastern Washington and Oregon to Wyoming and Colorado. Type locality: Ouray, Colorado.

Gayophytum Nuttallii var. *Abramsii* Munz, loc. cit. Puberulence short and spreading; pedicels and capsules mostly erect. Dry slopes, Transition Zone; eastern Washington and Oregon to southern California, Montana, and Nevada. Type locality: Coldwater Canyon, San Antonio Mountains, Los Angeles County, California.

3. *Gayophytum diffusum* Torr. & Gray. Diffuse *Gayophytum*. Fig. 3447.

Gayophytum diffusum Torr. & Gray, Fl. N. Amer. 1: 513. 1840.

With general habit and stature of *G. Nuttallii*; appressed-puberulent in upper parts; pedicels 2–8 mm. long, erect or divaricate; sepals 2–3 mm. long, reflexed in anthesis; petals white to pink, 2–4 mm. long; stigma clavate-capitate; capsules 5–12 mm. long, divaricate; seeds glabrous, 1–1.25 mm. long.

Occasional on dry slopes, Transition Zone; Washington to southern California, Montana, and Wyoming. Type locality: "Rocky Mountains and plains of Oregon," June–July.

Gayophytum diffusum var. *villosum* Munz, Amer. Journ. Bot. 19: 773. 1932. Upper parts of plant with a short spreading pubescence. Rare, Washington to mountains of southern California and Idaho. Type locality: Farewell Bend, Crook County, Oregon.

4. *Gayophytum lasiospermum* Greene. Hairy-seeded *Gayophytum*. Fig. 3448.

Gayophytum lasiospermum Greene, Pittonia 2: 164. 1891.

Plant 2–5 dm. high, branching freely above, with appressed puberulence in the upper parts. Leaves linear to lance-linear, 1–3 cm. long, entire; pedicels 3–6 mm. long, divaricate to spreading

or even reflexed; sepals 1 mm. long, reflexed in anthesis; petals white, turning to rose, 1 mm. long; stigma capitate; capsule 4–8 mm. long, torulose; seeds strigose-canescens, 1 mm. long.

Dry places, Transition Zone; Washington to southern California and Montana. Type locality: "near Julian, San Diego County, California." July–Sept.

Gayophytum lasiospermum var. *Hoffmannii* Munz, Amer. Journ. Bot. 19: 774. 1932. Upper parts puberulent with short spreading hairs. Occasional, dry slopes, Transition Zone; Mount Hood, Oregon, to southern California. Type locality: Stauffer Postoffice, Mount Pinos, Ventura County, California.

5. *Gayophytum eriospermum* Coville. Coville's *Gayophytum*. Fig. 3449.

Gayophytum eriospermum Coville, Contr. U.S. Nat. Herb. 4: 103. 1893.

Gayophytum lasiospermum var. *eriospermum* Jepson, Man. Fl. Pl. Calif. 689. 1925.

Plants 2–5 dm. tall, branching freely, the branches ascending, appressed-puberulent above. Leaves linear to lance-linear, 5–30 mm. long, entire, 1–3 mm. wide; pedicels 4–8 mm. long; sepals 3 mm. long; petals 3–5 mm. long, white, turning to rose; stigma capitate; capsules torulose, 4–7 mm. long; seeds strigose-canescens, 1 mm. long.

Rare, dry places, Transition Zone; Oregon and Idaho to southern Sierra Nevada, California. Type locality: east fork of Kaweah River, Tulare County, California. Aug–Sept.

6. *Gayophytum racemosum* Torr. & Gray. Black-foot *Gayophytum*. Fig. 3450.

Gayophytum racemosum Torr. & Gray, Fl. N. Amer. 1: 514. 1840.

Plants low, 1–2 dm. high, subsimple to repeatedly branched from the base, the ultimate branches leafy and relatively simple, strigillose or subglabrous. Leaves linear to linear-oblongate, 1–3 cm. long; pedicels from almost none to 2 mm. long, erect; sepals 0.5 mm. long; petals white, turning red, scarcely 1 mm. long; capsule subterete, narrowly linear, not torulose, erect, 6–14 mm. long; seeds erect, glabrous, 1 mm. long.

Dry slopes and flats, Transition Zone; Washington to southern California, Montana, Colorado, and Arizona. Type locality: "Near Black-Foot River," Idaho. July–Aug.

Gayophytum racemosum var. *caesium* (Torr. & Gray) Munz, Amer. Journ. Bot. 19: 776. 1932. (*Gayophytum caesium* Torr. & Gray, Fl. N. Amer. 1: 514. 1840.) Whole plant, or at least the upper portion, with minute short spreading hairs. Not common, Transition Zone; Washington to central California and Nevada. Type locality: near Walla Walla, Washington.

7. *Gayophytum Helli* Rydb. Heller's *Gayophytum*. Fig. 3451.

Gayophytum Helli Rydb, Bull. Torrey Club 40: 65. 1913.

Gayophytum Helli var. *erosulatum* Jepson, Man. Fl. Pl. Calif. 689. 1925.

Plants 1–3 dm. high, the stems with strict nearly erect branches, puberulent with short spreading hairs. Leaves linear, 5–20 mm. long, soft hirsutulous; sepals and petals scarcely 1 mm. long; fruiting pedicels about 1 mm. long; capsule narrowly linear, not torulose, 8–10 mm. long, subsessile, hirsutulous; seeds 1 mm. long, appressed-canescens.

Occasional, dry places, Transition Zone; Washington to southern California and Idaho. Type locality: Forest, Nez Perces County, Idaho. July–Aug.

Gayophytum Helli var. *glabrum* Munz, Amer. Journ. Bot. 19: 777. 1932. Plant quite glabrous. Occasional, Washington to central California, Idaho, and Colorado. Type locality: Silver City, Owyhee County, Idaho.

8. *Gayophytum humile* Juss. Low *Gayophytum*. Fig. 3452.

Gayophytum humile Juss. Ann. Sci. Nat. 25: 18. pl. 4. 1832.

Gayophytum pumilum S. Wats. Proc. Amer. Acad. 18: 193. 1883.

Low, 5–15 cm. high, glabrous, branched from base, the branches relatively simple. Leaves linear to lance-linear, 1–3 cm. long, entire, on short petioles, upper ones somewhat reduced, but quite well developed; pedicels scarcely evident; sepals 1 mm. long; petals white, 1 mm. long; capsule flattened, not torulose, erect, 10–15 mm. long; seeds obliquely placed in capsules, 0.6 mm. long.

Occasional, dry places, Transition Zone; Washington, and Idaho, to southern California; also Chile. Type locality: Chile. July–Aug.

Gayophytum humile var. *hirtellum* Munz, Amer. Journ. Bot. 19: 778. 1932. Plant puberulent with short spreading hairs. Rare and local, Transition Zone, eastern central California and adjacent Nevada. Type locality: Snow Valley, Ormsby County, Nevada.

10. *GAÛRA* L. Sp. Pl. 347. 1753.

Cauliscent herbs, annual to perennial. Leaves alternate. Flowers white or pink, in terminal racemes or spikes. Hypanthium narrow and short; sepals 4, deciduous. Petals 4, clawed. Stamens 8, usually with scale-like appendage at base of each filament. Ovary 4-celled, usually with single ovule in each cell. Stigma 4-lobed, with cup-like border at base. Capsule nut-like, obovoid, nearly or quite indehiscent, 1–4 seeded. [Name Greek, meaning proud, some species being showy.]

A genus of 18 species of the temperate parts of North America and Argentina. Type species, *Gaura biennis* L.

Antthers oval, attached near middle; leaves 1–3 cm. wide, 5–10 cm. long; plants 5–20 dm. tall, biennial; fruit almost equally 8-ribbed, glabrous.

Antthers linear, attached near the base; leaves 0.3–1 cm. wide, 1–4 cm. long; plants 1–5 dm. tall, perennial; fruit 4-angled, pubescent.

1. *G. parviflora*.

2. *G. coccinea*.



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3444. *Oenothera heterochroma*
 3445. *Gayophytum ramosissimum*
 3446. *Gayophytum Nuttallii*

3447. *Gayophytum diffusum*
 3448. *Gayophytum lasiospermum*
 3449. *Gayophytum eriospermum*

3450. *Gayophytum racemosum*
 3451. *Gayophytum Helleri*
 3452. *Gayophytum humile*

1. *Gaura parviflora* Dougl. Small-flowered Gaura. Fig. 3453.

Gaura parviflora Dougl. ex Hook. Fl. Bor. Amer. 1: 208. 1834.

Erect biennials, 5–20 dm. tall, simple or with few erect branches, silky-pilose, with long spreading hairs on stems, veins and leaf-margins, as well as with minute, close-set, glandular pubescence. Leaves ovate-lanceolate, almost sessile, repand-dentate to subentire, 3–10 cm. long, 1–3 cm. wide, the general leaf-surface finely pubescent; leaves of inflorescence mostly reduced to minute linear bracts; spikes 1–3 dm. long; flowers numerous, quite glabrous; hypanthium 2 mm. long; sepals 2–3 mm. long; petals 2–4 mm. long, reddish; fruit fusiform, 6–8 mm. long, almost equally 8-ribbed, quite glabrous; seeds brown, 1 mm. long.

Disturbed and waste places, Transition Zone; eastern Washington to eastern Oregon and the Mississippi Valley. Type locality: "sandy banks of the Walla-wallah River." June–Aug.

2. *Gaura coccinea* (Nutt.) Pursh. Scarlet Gaura. Fig. 3454.

Malva coccinea Nutt. ex Fraser's Cat. no. 51. 1813.

Gaura coccinea Pursh, Fl. Amer. Sept. 2: 733. 1814.

Stems several to many, branched so as to form a bushy plant, 1–5 dm. tall, perennial, usually strigose-canescens. Leaves numerous, sessile, oblong-lanceolate to linear, entire to repand-dentate, sessile, acute to obtuse, 1–3 cm. long, 3–10 mm. wide; floral bracts linear to lanceolate, 3–6 mm. long, persistent; spikes short, 1–2 dm. long; hypanthium 6–10 mm. long; sepals 6–9 mm. long; petals pink or red, turning scarlet, 5–8 mm. long; stamens equal, almost as long as petals; pistil about same length; fruits canescent, short-obovoid, 4-angled in upper half, 5–7 mm. long; seeds 2 mm. long.

Dry slopes, Upper Sonoran Zone; Providence Mountains, San Bernardino County, California, to South Dakota and Texas. Naturalized at Brea, southern California. Type locality: "Upper Louisiana," collected by Bradbury. April–June.

Gaura coccinea var. *glabra* (Lehm.) Torr. & Gray, Fl. N. Amer. 1: 518. 1840. (*Gaura glabra* Lehm. in Hook. Fl. Bor. Amer. 1: 209. 1834.) Plant nearly or quite glabrous on stem and leaves; leaves as in the species but more wavy; hypanthium strigillose. Montana southward to the eastern Mojave Desert, California, and Arizona and eastward to Nebraska and Texas. Type locality: "About Carlton-House on the Saskatchewan."

Gaura sinuata Nutt. ex Ser. in DC. Prod. 3: 44. 1828. Glabrate, branched in lower portion; leaves 2–5 cm. long, oblanceolate to oblong-linear, sinuate-dentate; floral bracts lanceolate to ovate with narrow tip, caducous; spikes on long naked peduncles; flowers quite large; petals white becoming red, 6–8 mm. long. Native of Texas and adjacent regions; occasionally naturalized in California, in San Mateo County and in southern California. Type locality: "In Arkanza et Red-River."

Gaura villösa Torr. Ann. Lyc. N.Y. 2: 200. 1828. Perennial soft-villous with long hairs; petals white, becoming red, about 8 mm. long; floral bracts ovate to ovate-lanceolate, caducous; stipe-like base of fruit 3–6 mm. long. Kansas to Texas and New Mexico. Locally established in Los Angeles County, California. Type locality: "Sources of the Canadian."

Gaura odorata Sessé ex Lag. Gen. & Sp. Pl. 14. 1816. Winter annual or biennial with short-hairy stems; sepals 10–13 mm. long; petals white or pink, becoming red, 7–8 mm. long; floral bracts lance-ovate, caducous. Texas to central Mexico. Locally established in southern California from Ventura County to San Diego County. Type locality: "Hab. in N[ova] H[ispania]."

11. *HETEROGAÛRA* Rothrock, Proc. Amer. Acad. 6: 350. 1864.

Caulescent annual herbs. Leaves alternate. Flowers pink, in terminal spicate racemes. Hypanthium short, obconic; sepals 4, deciduous. Petals 4, clawed. Stamens 8, erect, the 4 epipetalous ones sterile; filaments not appendaged. Stigma discoid, entire, without any basal cup-like border. Ovary 4-celled, with 1 ovule in each cell. Fruit 2–4-celled, 1–2-seeded. [Name Greek, different, and *Gaura*.]

A monotypic genus found only in California.

1. *Heterogaura heterandra* (Torr.) Coville. California Gaura. Fig. 3455.

Gaura heterandra Torr. Pacif. R. Rep. 4: 87. 1857.

Heterogaura californica Rothrock, Proc. Amer. Acad. 6: 354. 1864.

Heterogaura heterandra Coville, Contr. U.S. Nat. Herb. 4: 106. 1893.

Annual, stem erect, simple or paniculately few-branched, 1–4 dm. tall, minutely puberulent throughout. Leaves oblong-ovate to lanceolate, entire to remotely and shallowly denticulate, the blades 2–5 cm. long, about half as wide, on petioles 5–10 mm. long; pedicels 1–1.5 mm. long; hypanthium 2–3 mm. long; sepals about the same; petals pink, becoming lavender, spatulate, 3–5 mm. long; alternate stamens fertile, 2 mm. long, opposite ones sterile, 1 mm. long; capsule ridged, often triquetrous, 3 mm. long; seeds slender, 2 mm. long.

Shaded slopes at 1,500–3,000 feet altitude, Upper Sonoran Zone; western base of the Sierra Nevada from Placer County to San Bernardino County, California. Type locality: "Mokelumne Hill," California. May–June.

12. *CIRCAEA* L. Sp. Pl. 9. 1753.

Low, slender perennial herbs with subterranean rootstocks. Leaves opposite, thin, petioled. Flowers small, paniculately disposed in racemes. Hypanthium short, deciduous and with a ring-like disk within; sepals 2, reflexed. Petals 2, white, notched. Stamens 2, alternate with the petals. Ovary 1–2 celled, each cell 1-ovuled. Fruit nut-like, 1–2-seeded, obovoid, indehiscent, usually with hooked hairs. [Named for Circe, the enchantress.]

A genus of about 8 species, from the northern hemisphere. Type species, *Circaea lutetiana* L.

Plant 1–3 dm. tall; leaves cordate, sharply and coarsely dentate.

Plant 3–6 dm. tall; leaves usually rounded at base, sinuately denticulate.

1. *C. alpina*.

2. *C. pacifica*.

1. *Circaea alpina* L. Small Enchanter's Nightshade. Fig. 3456.*Circaea alpina* L. Sp. Pl. 9. 1753.

Erect, simple or branching, glabrous or puberulent above, 1–3 dm. tall. Leaf-blades cordate, 1.5–5 cm. long, almost or quite as wide, acute or acuminate, coarsely dentate, on petioles 1.5–3.5 cm. long; pedicels 3–4 mm. long, reflexed in fruit; sepals and petals about 1 mm. long; capsule narrowly obovoid, 1-celled, 2 mm. long, covered with weak soft hooked hairs.

Cold and moist woods, Boreal Zones; Alaska to Washington east to the Atlantic Coast; also Eurasia. Type locality: Europe. July–Aug.

2. *Circaea pacifica* Aschers. & Magnus. Pacific Enchanter's Nightshade.

Fig. 3457.

Circaea pacifica Aschers. & Magnus, Bot. Zeit. 29: 392. 1871.*Circaea alpina* f. *pacifica* G. N. Jones, Univ. Wash. Pub. Biol. 5: 195. 1936.

Stem from a short rootstock, simple, 2–4 dm. tall; plant glabrous. Leaf-blades ovate, sometimes orbicular, usually rounded at the base, sometimes cordate, entire or minutely denticulate or obscurely repand-denticulate, 2–6 cm. long, acuminate; petioles 2–3 cm. long; racemes bractless; sepals and petals about 1 mm. long; capsule narrowly obovoid, 1-celled, 1.5–2 mm. long, with hooked hairs.

Deep woods, Transition Zone; British Columbia to San Bernardino County, California, and the Rocky Mountains. Type locality: near San Francisco, California. June–Aug.

Family 107. HALORAGIDACEAE.

WATER-MILFOIL FAMILY.

Perennial, mainly aquatic herbs, with alternate or verticillate leaves, the submerged ones often pectinate-pinnatifid, or pinnately divided into fine capillary divisions. Flowers perfect or unisexual, axillary, solitary or clustered, or in interrupted spikes. Calyx of 2–4 sepals, or reduced to a narrow ring on the rim of the adnate hypanthium. Petals when present 2–4, small. Stamens 1–8. Ovary inferior, 1–4-celled; styles 1–4. Fruit a nutlet or drupe-like, angular, ribbed or winged, with 2–4 1-seeded carpels. Endosperm fleshy; cotyledons minute.

A family of 7 genera and about 100 species, of wide geographical distribution.

Submerged leaves pinnatifid, the emerged ones entire or toothed; petals 4 in staminate flowers; stamens 4–8; ovary 2–4-celled.

Leaves all simple and entire; petals none; stamen 1; ovary 1-celled.

1. *Myriophyllum*.2. *Hippuris*.1. *MYRIOPHYLLUM* [Vaill.] L. Sp. Pl. 992. 1753.

Aquatic or terrestrial herbs, with verticillate or alternate leaves, the emerged ones entire, dentate, or pectinate, the submerged ones pinnatifid into capillary segments. Flowers usually monoecious, 2-bracted, in the upper axils, often forming an interrupted spike, the upper ones generally staminate, the lower pistillate, and the intermediate often perfect. Staminate flowers with a very short hypanthium, 2–4 sepals, 2–4 petals and 4–8 stamens. Hypanthium of pistillate flowers 4-grooved. Sepals 4, minute, or sometimes reduced to a mere ring. Ovary 2–4-celled; ovules 1 in each cell, pendulous; style 4, short, often plumose. Fruit splitting when ripe into 4 indehiscent 1-seeded bony carpels. [Name from the Greek *myrios*, numberless, and *phyllon*, leaf.]

About 20 species, of wide geographical distribution. Type species *Myriophyllum spicatum* L.

Petals fugacious; stamens 8; flower-verticils in a terminal emerged interrupted spike; floral leaves reduced to bracts, shorter or but slightly exceeding the fruits.

Bracts entire or the lower serrate, spatulate-obovate.

Bracts pectinate.

1. *M. exalbescentis*.2. *M. verticillatum*.

Petals tardily deciduous; stamens 4; flower-verticils in the axils of the linear pectinate emerged leaves, these much exceeding the flowers.

3. *M. hippurioides*.1. *Myriophyllum exalbescentis* Fernald. American Milfoil. Fig. 3458.*Myriophyllum exalbescentis* Fernald, Rhodora 21: 120. 1919.*Myriophyllum spicatum* var. *exalbescentis* Jepson, Man. Fl. Pl. Calif. 691. 1925.

Stems simple or branching, 3–9 dm. high, submerged leaves in whorls of 3 or 4, commonly 12–30 mm. long, pinnately divided into 7–11 pairs of capillary segments, the rachis scarcely thicker than the capillary segments; flowers in emerged almost naked spicate verticils; floral bracts rarely equaling the fruit, spatulate-obovate or cochleiform, the lower serrate, the upper entire; petals fugacious, oblong-obovate, concave, 2.5 mm. long; stamens 8, about 1.5 mm. long; fruit subglobose, 2.5–3 mm. long; carpels rounded on the back, smooth or rugulose.

Ponds and quiet streams, mainly Transition and Upper Sonoran Zones; throughout the Pacific States and east across the continent, closely related to the Old World *M. spicatum* L. Type locality: York River, Quebec. July–Sept.

2. *Myriophyllum verticillatum* L. Whorl-leaved Milfoil. Fig. 3459.*Myriophyllum verticillatum* L. Sp. Pl. 992. 1753.

Aquatic herb, the stems simple or branched. Submerged leaves flaccid, in crowded whorls of threes or fours, pinnately divided into fine capillary segments, the rachis usually flattened and obviously broader than the segments; spikes 5–15 cm. long, emerged; floral leaves reduced to bracts, shorter or little exceeding the flowers, ovate, acute, pectinate; petals or the staminate flowers 4, purplish, fugacious; stamens 8; fruit subglobose, 2–3 mm. long.

Ponds and quiet streams, mainly Canadian and Transition Zones; in the Pacific States ranging from Washington to central California, thence across the continent; also Eurasia. Type locality: Europe. May–July.

3. *Myriophyllum hippurioides* Nutt. Western Milfoil. Fig. 3460.*Myriophyllum hippurioides* Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 530. 1840.

Aquatic herb, the stems simple or branching. Leaves in whorls of 4 or 5, the submerged ones 15–30 mm. long, pinnately dissected into capillary segments; emerged floral leaves linear to linear-lanceolate, much exceeding the flowers, pectinate or the upper entire; petals greenish white, tardily deciduous; fruit 2 mm. long, about 1 mm. thick; carpels flattened on the sides and nearly smooth; styles very short.

Ponds, Upper Sonoran Zone to Canadian Zone; southern Washington to central California. Apparently most abundant in the Pacific States along the lower Columbia River. Type locality: "Ponds of the Wahlamet," probably in the vicinity of Sauvie's Island, Oregon. May–July.

Myriophyllum elatinoides Gaudich. Ann. Sci. Nat. 5: 105. 1825. Specimens collected in the Deschutes River, Oregon, are very close if not identical with this species of South America, New Zealand and Tasmania. They have fugacious petals, 8 stamens; bracts 5–10 mm. long, lowest pectinate, the central serrate, and the upper entire, all exceeding the flowers; fruit ovoid, carpels smooth.

2. *HIPPÜRIS* L. Sp. Pl. 4. 1753.

Aquatic or terrestrial herbs with simple erect stems and simple entire verticillate leaves. Flowers small, axillary, perfect or sometimes unisexual. Sepals minute, entire. Petals none. Stamen 1, inserted on the anterior edge of the calyx. Style filiform, stigmatic, its whole length along one side and lying in the groove of the anther. Fruit 1-celled, 1-seeded, drupe-like. [Name from the Greek hippos, horse, and oura, tail.]

A monotypic genus of wide geographical distribution.

1. *Hippuris vulgaris* L. Mare's-tail. Fig. 3461.*Hippuris vulgaris* L. Sp. Pl. 4. 1753.

Stems simple, glabrous, 2–6 dm. high, completely submerged or more commonly emerged for 10–15 cm., the base rooting at the nodes. Leaves verticillate, 6–12 in a whorl, linear or lanceolate, sessile, 5–25 mm. long, 1–3 mm. wide, acute at apex; anther about 1 mm. long; filament very short and stout; fruit 2 mm. long, ellipsoid-obovoid; stigma persistent.

Ponds and streams, mainly Canadian and Transition Zones; Alaska to southern California on the Pacific Coast, east across the continent; also Eurasia and Patagonia. Type locality: in Europe. July–Sept.

Hippuris montana Ledeb. ex Reichb. Ic. Fl. Germ. 1: 71. pl. 86. fig. 181. 1834. Slender, 2–8 cm. high, forming mats, glabrous. Leaves mostly 4–6, linear, sessile, 4–8 mm. long; anther 0.3 mm. long, much shorter than the filament. Forming mats in wet alpine meadows, Hudsonian Zone; Alaska to Washington, where it has been collected on Stevens Pass, Mount Baker, Mount Rainier, and the Olympic Mountains. Considered by some as a form of *Hippuris vulgaris* L. Type locality: "Unalaschka."

Family 108. *ARALIACEAE*.

GINSENG FAMILY.

Herbs, shrubs, or trees, with alternate, verticillate, or rarely opposite leaves. Flowers perfect or polygamous, variously clustered. Hypanthium adnate to the ovary. Sepals often minute or sometimes absent. Petals usually 5, valvate or slightly imbricate, inserted on the margin of the hypanthium. Stamens as many as the petals and alternate with them, rarely wanting, inserted on the epigynous disk; filaments filiform or short; anthers introrse. Ovary 1- to several-celled; styles as many as the ovary cells; ovules 1 in each cell, pendulous, anatropous. Fruit a berry or drupe. Seeds flattened or 3-angled, with thin testa, copious endosperm and a small embryo.

About 50 genera and 475 species, widely distributed in temperate and tropical regions.

Leaves decomposed; styles 5; our species smooth perennial herbs.

Leaves simple, palmately lobed; styles 2; our species a spinescent shrub.

1. *Aralia*.2. *Oplopanax*.



3453



3454



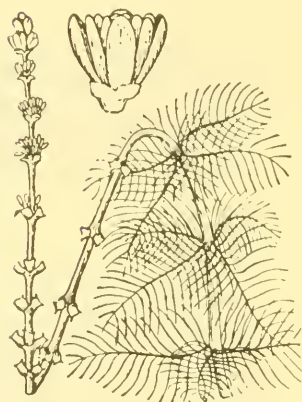
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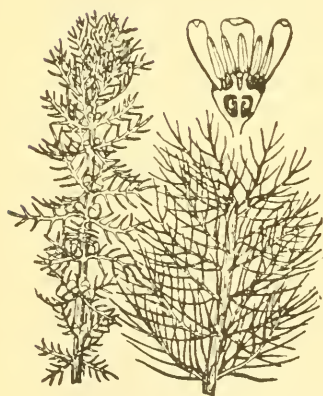
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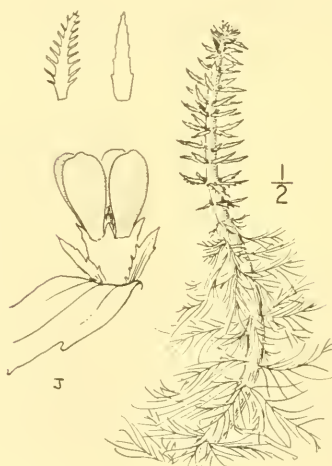
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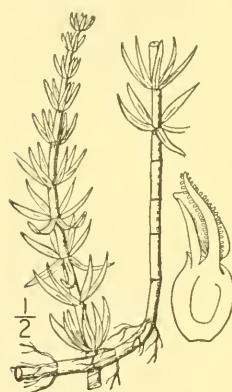
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3461

3453. *Gaura parviflora*3454. *Gaura coccinea*3455. *Heterogaura heterandra*3456. *Circaea alpina*3457. *Circaea pacifica*3458. *Myriophyllum exalbescens*3459. *Myriophyllum verticillatum*3460. *Myriophyllum hippurioides*3461. *Hippuris vulgaris*

1. *ARÀLIA* [Tourn.] L. Sp. Pl. 273. 1753.

Perennial herbs, shrubs, or trees, with alternate pinnately or ternately decompound leaves and sheathing petioles. Flowers white or greenish, borne in racemose, corymbose or paniculate umbels. Pedicels jointed below the flowers. Sepals 5 or obsolete. Petals 5, spreading, obtuse with short inflexed points. Stamens 5. Disk depressed. Ovary 5-celled. Fruit a small berry. [Name unexplained.]

About 30 species, natives of North America and Asia. Type species, *Aralia racemosa* L.

Umbels numerous, paniculate.
Umbels 1-7, corymbose.

1. *A. californica*.
2. *A. nudicaulis*.

1. *Aralia californica* S. Wats. California Spikenard. Fig. 3462.

Aralia californica S. Wats. Proc. Amer. Acad. 11: 144. 1876.

Aralia californica var. *acuminata* S. Wats. ex Howell, Fl. N.W. Amer. 271. 1898.

Perennial herb from large roots with milky juice; the stems simple, stout, 1-3 m. high. Leaves ternate, then pinnately 3-5-foliolate, glabrous; leaflets 5-25 cm. long, ovate to elliptic ovate, acuminate at apex, subcordate at base, serrate; panicle 30-45 cm. long; glandular-tomentulose, umbels numerous, many-flowered; pedicels 1-2 cm. long; involucre bracts, several, small, linear; sepals minute; petals scarcely 2 mm. long; berry red, becoming black in ripening, 4-5 mm. broad.

Stream banks and moist woods, Transition and Upper Sonoran Zones; southwestern Oregon, south in the Sierra Nevada, and the Coast Ranges to southern California. Type locality: northern California. July-Sept.

2. *Aralia nudicaulis* L. Wild Sarsaparilla. Fig. 3463.

Aralia nudicaulis L. Sp. Pl. 274. 1753.

Perennial from an elongated rootstock, the leaf and peduncle arising from a very short stem, sheathed at the base by thin dry scales. Leaves ternate, the primary divisions slender-stalked, pinnately 3-5-foliolate; petioles erect, 15-30 cm. long; leaflets oval to ovate-lanceolate, acuminate, 5-10 cm. long, finely serrate; umbels usually 3; involucre none; flowers greenish, 3 mm. broad; berry globose, 5-6 mm. in diameter, purple-black.

Moist woods, Transition and Boreal Zones; in the Pacific States known only from Mount Carlton, Spokane County, Washington, extending from there eastward to Newfoundland, Colorado, Missouri, and Georgia. Type locality: Virginia. May-June.

2. *OPLOPÀNAX* (Torr. & Gray) Miq. Ann. Mus. Lugd.-Batav. 1: 16. 1863.

A densely prickly shrub, with large palmately lobed leaves. Flowers in racemose or paniculate umbels, small, greenish white, the rays subtended by lacinate bracts. Sepals obsolete. Petals 5, valvate. Stamens 5, with filiform filaments. Ovary 2-3-celled; styles 2. Fruit a berry, laterally compressed, bicarpellate. [Name Greek, meaning weapon, and *Panax*, a generic name used in the Araliaceae.]

A monotypic genus of western North America and northeastern Asia.

1. *Oplopanax horridum* (J. E. Smith) Miq. Devil's Club. Fig. 3464.

Panax horridum J. E. Smith in Rees, Cyclop. 26: no. 10. 1813.

Echinopanax horridum Cooper, Pacif. R. Rep. 12: 31. 1860. (Nomen nudum)

Oplopanax horridum Miq. Ann. Mus. Bot. Lugd.-Batav. 1: 16. 1863.

Fatsia horrida Benth. & Hook ex S. Wats. Bot. Calif. 1: 273. 1876.

Ricinophyllum horridum Nels & Macbr. Bot. Gaz. 61: 45. 1916.

Ill-scented, densely prickly shrub, 2-4 m. high. Leaves rounded in outline, 15-50 cm. broad, cordate at base with narrow sinus, palmately lobed, the lobes acute and irregularly serrate, the petioles and veins prickly; inflorescence terminal, 10-30 cm. long, wooly-pubescent and prickly; peduncles subtended by fimbriate bracts; stamens well exceeding the ovate petals; berry scarlet, 4-5 mm. long.

Streams and moist woods, Canadian and Humid Transition Zones; Alaska to Crater Lake, Oregon, east to Montana, and Isle Royale, Lake Superior; also in Japan. Type locality: Nootka Sound. May-July.

Family 109. UMBELLÍFERAE.*

CARROT FAMILY

Herbs with usually hollow stems and alternate compound or rarely simple leaves, the petioles commonly dilated at base. Stipules when present minute. Inflorescence

* Text contributed by Mildred Esther Mathias and Lincoln Constance.

a compound or simple umbel or rarely a head, the umbels and umbellets usually involucrate or involucrellate. Flowers small, epigynous, perfect or often polygamous. Hypanthium completely adnate to the ovary. Sepals usually 5, evident or often obsolete. Petals 5, inserted on the margin of the hypanthium, their tips often inflexed. Stamens 5, alternate with the petals, inserted on the margin of the epigynous disk; filaments filiform; anthers versatile. Ovary bicarpellate, 2-celled; styles 2, distinct, slender, usually borne on a stylopodium; ovules 1 in each cell, pendulous, anatropous. Fruit dry, usually ribbed or winged, the two carpels separating at maturity along the plane of their contiguous faces (commissure), either flattened laterally, that is at right angles to the commissure, or dorsally, that is parallel with the commissure, or sometimes terete; the 2 mericarps attached to a carpophore; pericarp usually containing oil-tubes between the ribs and on the commissural side. Seed generally adnate to the pericarp; endosperm cartilaginous; embryo small.

About 250 genera and 2,000 species, widely distributed geographically.

Inflorescence a distinct umbel, more or less spreading, never capitate.

Leaves simple; umbels simple or proliferous.

Ovary and fruit glabrous; foliage glabrous.

Leaves with a definite ovate to orbicular blade.

1. *Hydrocotyle*.

Leaves reduced to hollow cylindrical jointed phyllodes.

2. *Lilaeopsis*.

Ovary and fruit covered with stellate hairs; foliage more or less stellate-pubescent.

3. *Bowlesia*.

Leaves variously compound; umbels irregularly or perfectly compound.

Ovary and fruit armed with bristles, spines or tubercles.

Ovary and fruit variously armed with spines, uncinat bristles or tubercles.

Plants biennial or perennial; flowers perfect and staminate.

4. *Sanicula*.

Plants annual; flowers all perfect.

Plants glabrous; leaf-divisions more or less elongate, filiform.

5. *Apiastrum*.

Plants more or less pubescent; leaf-divisions shorter.

Involucre of conspicuous foliaceous bracts; leaves 3-4-pinnatisect; fruit bristly only on the ribs.

6. *Caucalis*.

Involucre absent or of linear bracts; leaves pinnate to 3-pinnatisect; fruit bristly or tuberculate throughout.

Fruit not beaked; bractlets longer than the pedicels.

7. *Torilis*.

Fruit beaked; bractlets shorter than the pedicels.

8. *Anthriscus*.

Ovary and fruit armed with bristles; bristles never uncinat.

Fruit linear or linear-oblong, several times longer than broad; oil-tubes absent or obscure.

Plants annual; fruit with an elongated beak several times longer than the body.

9. *Scandix*.

Plants perennial; fruit not beaked or with a beak much shorter than the body.

10. *Osmorhiza*.

Fruit oblong to oblong-ovoid, not more than twice as long as broad; oil-tubes present.

Leaves glabrous; fruit armed with unequal subulate bristles.

11. *Ammoselinum*.

Leaves more or less pubescent; fruit armed with barbed bristles.

12. *Daucus*.

Ovary and fruit not armed, sometimes pubescent.

Ribs of the fruit not prominently winged; fruit terete in cross-section or somewhat laterally compressed.

Flowers white, greenish or pinkish, rarely purple.

Fruit elongate, several times longer than broad.

10. *Osmorhiza*.

Fruit orbicular to oblong, not more than twice as long as broad.

Plants annual.

Petals conspicuously unequal; sepals prominent; fruit subglobose.

13. *Coriandrum*.

Petals equal; sepals absent; fruit ovoid to oblong.

14. *Apium*.

Plants perennial or biennial.

Plants mostly tall, caulescent; involucre usually present.

Bracts divided into filiform segments, closely reflexed.

16. *Ammi*.

Bracts entire or toothed, spreading or rarely reflexed, sometimes wanting.

Stems purple-dotted; oil-tubes absent or obscure; leaves decompose into small segments.

17. *Conium*.

Stems not purple-dotted; oil-tubes present; leaves pinnately or ternate-pinnately divided, the segments mostly larger.

Leaves all once pinnate.

Ribs filiform, pericarp forming a continuous corky covering; stylopodium conical.

18. *Berula*.

Ribs corky, equal; stylopodium depressed.

19. *Sium*.

Leaves pinnately or ternate-pinnately divided or the uppermost once pinnate.

Ribs not corky; stylopodium prominent; plants of dry ground or moist meadows.

Leaf-divisions few, mostly entire; ribs filiform.

Biennials from taproots.

20. *Carum*.

Perennials from tuberous or fusiform fasciated roots.

21. *Perideridia*.

- Leaf-divisions many, incised or serrate; ribs prominent or somewhat winged. 22. *Ligusticum*.
 Ribs corky; stylopodium absent or low; plants of marshes or stream banks.
 Styles short, less than half the length of the fruit; fruit ovoid to subglobose. 23. *Cicuta*.
 Styles long, about half the length of the fruit; fruit sub-cylindric. 24. *Oenanthe*.
 Plants low, acaulescent; involucre absent.
 Plants pubescent.
 Pedicels of the flowers subequal; sepals not rigid. 25. *Podistera*.
 Pedicels of the sterile flowers longer than or equaling the fruit; sepals rigid. 26. *Oreonana*.
 Plants glabrous.
 Fruit orbicular, the ribs 7, corky; leaves coriaceous. 27. *Rhysopteris*.
 Fruit linear-oblong to oblong; leaves thin.
 Ribs unequal, the lateral conspicuously corky-thickened. 28. *Orogenia*.
 Ribs equal, filiform. 31. *Tauschia*.
 Flowers yellow.
 Involucre absent; leaf-divisions filiform; plants with anise odor. 29. *Foeniculum*.
 Involucre present; leaf-divisions linear to ovate; plants without anise odor.
 Basal leaves simple; stem-leaves simple, ternate or quinate. 30. *Zizia*.
 Basal and stem-leaves pinnate, ternate or pinnately or ternately compound.
 Biennials; stylopodium low, conical. 31. *Tauschia*.
 Perennials; stylopodium none. 15. *Petroselinum*.
 Some or all of the ribs of the fruit winged; fruit more or less dorsally compressed.
 Lateral ribs winged, dorsal ribs filiform.
 Marginal flowers of the umbel with subequal petals; plants lower, mostly slender.
 Leaves simply pinnate; leaf-divisions mostly ovate.
 Flowers white; aquatic herbs from fascicled tubers. 32. *Oxypholis*.
 Flowers yellow; plants not aquatic; roots fusiform. 33. *Pastinaca*.
 Leaves pinnately or ternate-pinnately divided; leaf-divisions mostly linear to filiform.
 Plants annual; stems leafy; leaf-divisions filiform; plants with anise odor. 34. *Anethum*.
 Plants perennial; acaulescent or short-caulescent; leaf-divisions mostly broader; plants without anise odor. 35. *Lomatium*.
 Marginal flowers of the umbel with radiately enlarged petals; tall stout plants. 36. *Heracleum*.
 Lateral, dorsal and intermediate ribs winged or prominent.
 Plants tall; stems leafy.
 Umbellets not capitate.
 Coarse plants; leaf-divisions large, ovate to lanceolate, serrate, toothed or entire. 37. *Angelica*.
 Slender plants; leaf-divisions small, oblong, incised or deeply toothed. 38. *Conioselinum*.
 Umbellets capitate. 39. *Sphenosciadium*.
 Plants mostly low, acaulescent.
 Leaf-divisions broad, 0.5–3 cm. wide; maritime. 40. *Glehnia*.
 Leaf-divisions narrow, mostly less than 0.5 cm. wide; desert and mountain areas.
 Plants mostly caulescent; bractlets usually inconspicuous; sepals prominent. 41. *Pteryxia*.
 Plants acaulescent; bractlets usually conspicuous; sepals not prominent. 42. *Cymopterus*.
 Inflorescence capitate, not umbellate. 43. *Eryngium*.
 Fruit winged, not squamose.
 Fruit not winged, ribless, variously squamose.

1. HYDROCÓTYLE L. Sp. Pl. 234. 1753.

Low perennials growing in or near water, with slender creeping stems. Leaves orbicular, peltate or reniform; umbels simple or proliferous; sepals minute or obsolete. Petals small, white. Fruit orbicular to ellipsoid, strongly flattened laterally. Carpel with 5 primary ribs. Oil-tubes wanting or obscure. [Greek, meaning water-cup.]

About 75 species, of wide distribution. Type species, *Hydrocotyle vulgaris* L.

Leaves peltate; ribs of the fruit broad, thick and corky.

Inflorescence a simple umbel.

Inflorescence an interrupted spike.

Leaves roundish-reniform, not peltate; ribs of the fruit filiform.

1. *H. umbellata*.

2. *H. verticillata*.

3. *H. ranunculoides*.

1. *Hydrocotyle umbellata* L. Umbellate or Many-flowered Marsh-pennywort. Fig. 3465.

Hydrocotyle umbellata L. Sp. Pl. 234. 1753.

Stems creeping, from tuberiferous rootstocks. Leaves orbicular-peltate, crenate, the petioles slender, erect; peduncles often equaling or exceeding the leaves; umbels many-flowered, simple

or rarely slightly proliferous; pedicels 2–25 mm. long; fruit 1–2 mm. long, 2–3 mm. broad, deeply notched at apex; pericarp thin between the thick and corky ribs.

Borders of marshes and streams, Sonoran Zones; Oregon to southern California to the Atlantic States, south to Mexico and South America; also southern Africa. Type locality: "in America," probably Virginia. March–July.

2. *Hydrocotyle verticillata* Thunb. Whorled Marsh-pennywort. Fig. 3466.

Hydrocotyle verticillata Thunb. Diss. Hydroc. 2. 1798.

Hydrocotyle cuneata Coult. & Rose, Contr. U.S. Nat. Herb. 7: 28. 1900.

Stems creeping in mud, from tuberiferous rootstocks. Leaves orbicular-peltate, crenate, the petioles slender, ascending; peduncles about equaling the leaves; inflorescence an interrupted, simple, once or twice bifurcate, rarely trifurcate or quadrifurcate, spike; fruit sessile or subsessile, shallowly notched at apex, narrowly rounded to abruptly cuneate at base.

Streams and low ground, Sonoran Zones; central and southern California to the Atlantic States, south to Mexico; also Bermuda, Jamaica and West Indies. Type locality: probably "America." April–Sept.

Hydrocotyle verticillata var. *triradiata* (A. Rich) Fernald, Rhodora 41: 437. 1939. (*Hydrocotyle prolifer* Kell. Proc. Calif. Acad. 1: 15. 1854.) Peduncles slender, usually equaling or exceeding the petioles; inflorescence an interrupted simple, rarely branched, spike; fruit pedicellate, pedicels 1–10 mm. long. Borders of marshes and streams, Sonoran Zones; San Francisco Bay to the Sacramento and San Joaquin Valleys, California, east to the Atlantic States, and south to South America and West Indies. Type locality: "Mexico."

3. *Hydrocotyle ranunculoides* L. f. Floating Marsh-pennywort. Fig. 3467.

Hydrocotyle ranunculoides L. f. Suppl. 177. 1781.

Stems floating or creeping in mud. Leaves 5–80 mm. broad, roundish reniform, not peltate, cordate at base, 5–6-lobed and crenate, the petioles elongate, weak; peduncles much shorter than the petioles, recurved in fruit; umbels simple, capitate, 5–10-flowered; pedicels 1–3 mm. long; fruit suborbicular, 2–3 mm. broad; pericarp thick, the ribs filiform, obscure.

Ponds, marshes and slow streams, mainly Sonoran Zones; Washington to Lower California, east to Pennsylvania, and south to South America; also southern Europe. Type locality: Mexico. March–Aug.

2. *LILAEOPSIS* Greene, Pittonia 2: 192. (Sept.) 1891.

Small, tufted, glabrous perennials from long creeping rhizomes. Leaves reduced to fistulose, septate phyllodes borne at the nodes. Inflorescence of simple, axillary, few-flowered umbels on slender peduncles. Involucre of a few small bracts. Pedicels slender, ascending to reflexed and pendulous. Flowers white; sepals small; stylopodium obsolete; styles short. Fruit globose or ovoid, slightly flattened laterally if at all; dorsal ribs filiform, the lateral very thick and corky next to the commissure. [Name Greek, meaning *Lilaea*-like.]

A genus of world-wide distribution, comprising 4 or 5 closely related species. Type species, *Hydrocotyle chinensis* L.

1. *Lilaeopsis occidentalis* Coult. & Rose. Western Lilaeopsis. Fig. 3468.

Lilaeopsis occidentalis Coult. & Rose, Bot. Gaz. 24: 48. fig. 2. 1897.

Lilaeopsis lineata var. *occidentalis* Jepson, Madroño 1: 139. 1923.

Phyllodes linear, terete, 2.5–15 cm. long, 1–4 mm. broad. Peduncles 0.5–4.5 cm. long, weak, shorter than the leaves; umbels 5–12-flowered; pedicels slender, 2–8 mm. long; fruit ovoid, 2 mm. long, 1.25–2 mm. broad; dorsal ribs obscure, the lateral broad.

Marshes, Transition Zone; Vancouver Island to coastal central California. Type locality: salt marshes of Tillamook Bay, Oregon. June–Aug.

3. *BOWLESIA* Ruiz & Pav. Fl. Peruv. Prod. 44. pl. 34. 1794.

Slender branching annuals, with stellate pubescence. Stipules scarious, lacerate. Leaves opposite, simple, lobed. Umbels on axillary peduncles, simple, few-flowered. Sepals rather prominent. Corolla white. Fruit stellate-pubescent, broadly ovoid, with a narrow commissure, and without ribs or oil-tubes, the dorsal portion of each carpel inflated. Seed flattened dorsally, the face and back plane or convex. [Named for William Bowles, 1705–1780, Irish naturalist and traveler.]

A genus of about 20 species, chiefly South American. Type species, *Bowlesia palmata* Ruiz & Pav.

1. *Bowlesia incana* Ruiz & Pav. *Bowlesia*. Fig. 3469.

Bowlesia incana Ruiz & Pav. Fl. Peruv. 3: 28. pl. 268. 1802.

Bowlesia lobata of North American authors, not *B. lobata* Ruiz & Pav.

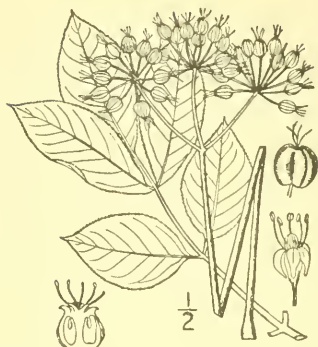
Bowlesia septentrionalis Coult. & Rose, Contr. U.S. Nat. Herb. 7: 31. 1900.

Stems slender, weak, 1.5–5 dm. long or high, dichotomously branching. Leaves on slender petioles, cordate to reniform, 0.4–3 cm. broad, thin, 5–7-lobed, the lobes entire or toothed; umbels on short peduncles, 2–6-flowered; fruit 1–1.5 mm. long, sessile or subsessile.

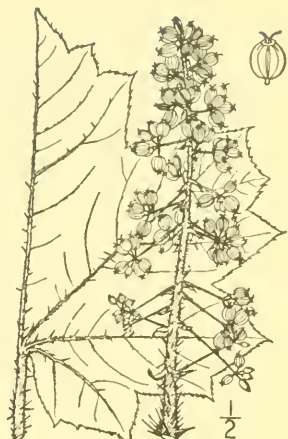
Partially shaded slopes, Upper Sonoran Zone; central California to northern Lower California, east to Louisiana; also in South America. Type locality: Peru. March–May.



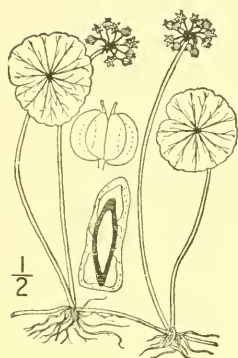
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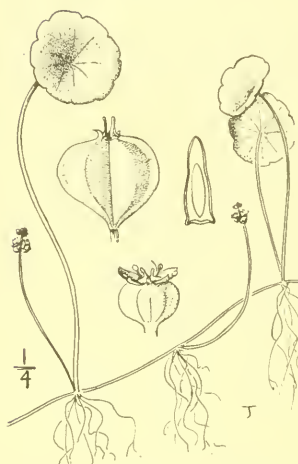
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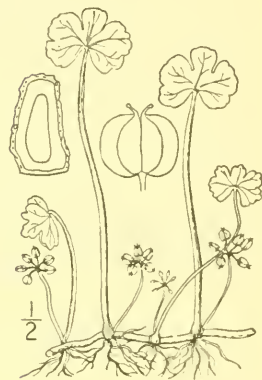
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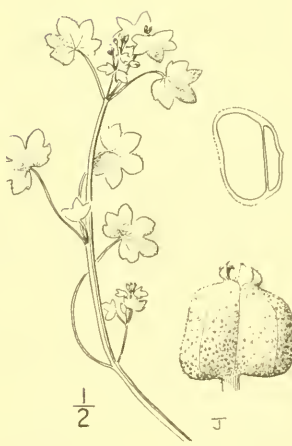
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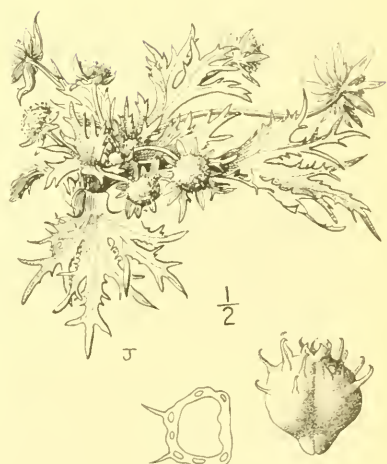
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3462. *Aralia californica*

3463. *Aralia nudicaulis*

3464. *Oplopanax horridum*

3465. *Hydrocotyle umbellata*

3466. *Hydrocotyle verticillata*

3467. *Hydrocotyle ranunculoides*

3468. *Lilaeopsis occidentalis*

3469. *Bowlesia incana*

3470. *Sanicula arctopoides*

4. *SANÍCULA* L. Sp. Pl. 235. 1753.

Glabrous or pubescent biennial or perennial herbs, with few-leaved or nearly naked stems. Leaves palmately or pinnately divided or rarely entire, the divisions pinnatifid or incised. Umbels irregularly compound, few-rayed, bearing involucre and involucre. Sepals evident, somewhat foliaceous, persistent. Corolla greenish yellow or purple. Fruit subglobose, densely covered with hooked bristles or tubercles. Carpels not ribbed; oil-tubes usually several to numerous. [Name Latin, meaning to heal.]

A genus of about 20 species, widely distributed over the north temperate regions; also South America and South Africa. About 17 species are in the United States. Type species, *Sanicula europaea* L.

Basal leaves ternately or palmately divided, rarely entire.

Fruit pedicellate or stipitate.

Involucre conspicuous, exceeding the heads.

1. *S. arctopoides*.

Involucre inconspicuous, not exceeding the heads.

Primary leaf-divisions pinnatifid.

Petiole and midrib somewhat glandular; leaves deltoid.

2. *S. arguta*.

Petiole and midrib glabrous, not glandular; leaves oblong-ovate.

3. *S. nevadensis*.

Primary leaf-divisions lobed or merely serrate, not deeply pinnatifid.

4. *S. crassicaulis*.

Fruit sessile.

Primary divisions of basal leaves lobed or serrate, not deeply pinnatifid.

Involucre equaling to slightly exceeding heads; basal leaves deeply lobed; Oregon coast.

4. *S. crassicaulis* Howellii.

Involucre shorter than heads; basal leaves entire or 3-lobed; San Francisco Bay region.

5. *S. maritima*.

Primary divisions of basal leaves deeply pinnatifid.

Primary divisions distinct at base; fruit ovoid, 3-5 mm. long.

3. *S. nevadensis*.

Primary divisions confluent at base; fruit globose to ellipsoid, about 2 mm. long.

6. *S. laciniata*.

Basal leaves pinnately divided to pinnately or ternate-pinnately decompound.

Stem from a fusiform taproot.

Leaves with a winged toothed rachis.

Fruits several in each umbellet, bristly; pedicels of sterile flowers inconspicuous in fruit.

7. *S. bipinnatifida*.

Fruits solitary, rarely 2-3 in each umbellet, bristly only above; pedicels of sterile flowers conspicuous in fruit.

8. *S. Peckiana*.

Leaves without a winged rachis; leaves 2-3-pinnate.

9. *S. bipinnata*.

Stem from a globose or somewhat irregular tuber.

Flowers salmon-colored; fruit 2.5-3 mm. long, the upper tubercles armed with short subulate bristles.

10. *S. saxatilis*.

Flowers yellow; fruit 1.5-2 mm. long, the tubercles unarmed.

11. *S. tuberosa*.

1. *Sanicula arctopoides* Hook. & Arn. Bear's-foot Sanicle or Snake-root. Fig. 3470.

Sanicula arctopoides Hook. & Arn. Bot. Beechey 141. 1832.

Plants conspicuous by the yellowish foliage, the stems very short, from a stout taproot, bearing a cluster of basal leaves and several spreading scape-like branches, 5-30 cm. long. Leaves 2-6.5 cm. long, deeply palmately 3-parted, the divisions once or twice lacinate-dentate, and the whole margin usually dissected into lanceolate acute segments; umbels terminating the branches, 1-4-rayed, the rays usually elongate; bracts 1 or 2, foliaceous; bractlets usually 8-12, conspicuously exceeding the heads; fruit short-pedicellate, 2-5 mm. long, strongly bristly above, naked below; seed-face concave.

Open hillsides, mainly Humid Transition Zone; near the coast from northern Oregon to central California. Type locality: "northwest coast of America." March-June. Footsteps-of-spring, Yellow Mats.

2. *Sanicula arguta* Greene. Sharp-toothed Sanicle. Fig. 3471.

Sanicula arguta Greene ex Coult. & Rose, Contr. U.S. Nat. Herb. 7: 36. 1900.

Stems more or less branched from a thickened taproot, 15-50 cm. high. Leaves 3-11 cm. long, palmately 3-5-parted, the middle divisions longer and distant, all the divisions spinose-serrate to sublacinate, decurrent, forming a broad toothed wing to the rachis, glandular-roughened above; umbels 3-5-rayed; bracts foliaceous; bractlets linear or linear-lanceolate, entire to 3-lobed, spinosely tipped; flowers yellow, the sterile pedicellate, the fertile sessile; fruit 4-6 mm. long, obovoid, stipitate, bristly above, almost naked below.

Open hillsides near the coast, Sonoran Zones; southern California. Type locality: hills near San Diego. March-April.

3. *Sanicula graveolens* Poepp. Sierra Sanicle. Fig. 3472.

Sanicula graveolens Poepp. ex DC. Prod. 4: 85. 1830.

Sanicula nevadensis S. Wats. Proc. Amer. Acad. 11: 139. 1876.

Sanicula septentrionalis Greene, Erythea 1: 6. 1893.

Sanicula divaricata Greene, Erythea 3: 64. 1895.

Sanicula apiifolia Greene, Leaflets Bot. Obs. 2: 46. 1910.

Sanicula nevadensis var. *glauca* Jepson, Madroño 1: 113. 1923.

Sanicula septentrionalis var. *nemoralis* Jepson, Fl. Calif. 2: 667. 1936.

Stems erect, the main stem obsolete, short or elongated, peduncles thus arising basally or

separately along the stem, 1–4.5 dm. high. Leaves ternate, the divisions usually oblong-ovate, 3–5-lobed, the lobes irregularly lobed or toothed; umbels 4–9 rayed; bracts foliaceous, pinnatifid; bractlets more or less united, small, acute; flowers yellow, the sterile short-pedicellate; fruit 3–5 mm. long, short-pedicellate, bristly throughout; seed face slightly concave.

Open coniferous forests, Arid Transition Zone; Clallam County, Washington to Siskiyou Mountains, Sierra Nevada and San Bernardino Mountains, California, and also Chile. Type locality: Chile. April–July.

4. *Sanicula crassicaulis* Poepp. Pacific Sanicle. Fig. 3473.

Sanicula crassicaulis Poepp. ex DC. Prod. 4: 84. 1830.

Sanicula Menziesii Hook. & Arn. Bot. Beechey 142. 1832.

Sanicula nudicaulis Hook. & Arn. op. cit. 347. 1838.

Sanicula tripartita Suksd. Allg. Bot. Zeit. 12: 5. 1906.

Sanicula Menziesii var. *foliacea* Jepson, Madroño 1: 111. 1923.

Sanicula Menziesii var. *pedata* Jepson, loc. cit.

Sanicula diversiloba Suksd. Werdenda 1: 29. 1927.

Stems simple below, branching above, erect, 2.4–12.5 dm. high, from a stout taproot. Leaves round-cordate to subtriangular, 4–14 cm. broad, deeply palmately 3–5-lobed, the primary divisions incised-lobed, the teeth spinulose; upper leaves with narrower lobes; umbels with 3 or 4 slender rays; bracts 2–3, small, foliaceous; bractlets 6–8, small, entire; flowers yellow, the sterile short-pedicellate; fruit distinctly stipitate but not pedicellate; subglobose, 2–5 mm. long, covered with stout bristles; seed face deeply sulcate.

Woods and shady slopes, Upper Sonoran and Transition Zones; Vancouver Island to southern California, also in South America. Type locality: Chile. March–June.

Sanicula crassicaulis var. *Howellii* (Coults. & Rose) Mathias, Brittonia 2: 242. 1936. (*Sanicula Howellii* Coults. & Rose, Bot. Gaz. 13: 81. 1888.) Usually lower; bractlets more prominent, about equaling the heads; fruit subsessile. Seashore sands, Canadian Zone; coastal Oregon. Type locality: "sandy shores, Tillamook Bay and Ocean Beach, Oregon."

5. *Sanicula maritima* Kell. Adobe or Salt-marsh Sanicle. Fig. 3474.

Sanicula maritima Kell. ex S. Wats. Bot. Calif. 2: 451. 1880.

Stems stout, 1.5–3.5 dm. high from a thickened taproot. Basal leaves long-petiolate, cordate, 2–5 cm. long, entire, repand or slightly serrate; peduncles few, elongate; umbels 1–4-rayed; bracts foliaceous, lobed or parted; bractlets many, small, lanceolate; flowers yellow, in dense heads, the sterile short-pedicellate; fruit about 5 mm. long, somewhat naked below; seed-face concave, with a prominent central longitudinal ridge.

Heavy adobe soil, or edges of salt marshes, Upper Sonoran Zone; about San Francisco Bay, California. Type locality: "near the coast, about San Francisco or northward, California." April–June.

6. *Sanicula laciniata* Hook. & Arn. Coast Sanicle. Fig. 3475.

Sanicula laciniata Hook. & Arn. Bot. Beechey 347. 1838.

Sanicula serpentina Elmer, Bot. Gaz. 41: 312. 1906.

Stems usually slender, branching from the base, 0.9–5 dm. high. Leaves ovate, 3-lobed or 3-parted, the divisions toothed to pinnately parted, with bristle-tipped teeth; umbels 3–6-rayed; bracts foliaceous, the bractlets small, apiculate; flowers yellow; fruit orbicular, 2 mm. long, sessile.

Hillsides, Upper Sonoran and Transition Zones; Coast Ranges from southwestern Oregon to San Luis Obispo County, California. Type locality: California, definite locality not given. March–June.

7. *Sanicula bipinnatifida* Dougl. Purple Sanicle. Fig. 3476.

Sanicula bipinnatifida Dougl. ex Hook. Fl. Bor. Amer. 1: 258. pl. 92. 1832.

Sanicula nemoralis Greene, Erythra 1: 6. 1893.

Sanicula bipinnatifida var. *flava* Jepson, Madroño 1: 112. 1923.

Sanicula bipinnatifida var. *Hoffmanii* Munz, Bull. S. Calif. Acad. 31: 110. 1932.

Stems rather stout, 1.5–8 dm. high, from a thickened rootstock. Basal leaves several, polymorphic, serrulate to pinnately 3–7-parted, the divisions cleft or lobed, decurrent on the rachis, forming a toothed wing; umbel 3–5-rayed; bracts foliaceous; flowers purple or yellow, in dense heads, the sterile pedicellate; fruit 3–6 mm. long, bristly throughout; seed-face sulcate.

Open hillsides, Upper Sonoran and Transition Zones; Vancouver Island to Lower California. Type locality: "Fort Vancouver on the Columbia," Washington. Feb.–May.

8. *Sanicula Peckiana* J. F. Macbride. Peck's Sanicle. Fig. 3477.

Sanicula Peckiana J. F. Macbride, Contr. Gray Herb. No. 59: 28. 1919.

Stems rather slender, usually solitary from a taproot, sparsely branched, 2.5–4 dm. high. Basal leaves 5–10 cm. long, pinnate or the main divisions decurrent on the narrowly winged and toothed rachis, the divisions irregularly toothed with obscurely or not at all acicular teeth; staminate flowers rather numerous, on slender pedicels surrounding and partly concealing the few fruits, these sessile, 3–4 mm. long, naked below, the tubercles above the middle terminated by weak prickles.

Open woods, Transition Zones; Siskiyou Mountains of southern Oregon and northern California. Type locality: fourteen miles west of Waldo, Oregon.

9. *Sanicula bipinnata* Hook. & Arn. Poison Sanicle. Fig. 3478.

Sanicula bipinnata Hook. & Arn. Bot. Beechey 347. 1838.

Sanicula pinnatifida Torr. Bot. Wilkes Exp. 314. 1874.

Stems slender, erect, 1–6 dm. high, from a slender fusiform root. Leaves twice or thrice pinnate, the divisions not at all decurrent, ovate to oblong, incisedly toothed; flowers yellow; fruit 2–3 mm. long, with strong tubercles tipped with short hooked bristles; seed-face deeply sulcate.

Open woods, Transition and Upper Sonoran Zones; California, from the North Coast Ranges and the Sierra Nevada to the southern part of the state. Type locality: California, but exact locality not given. April–June.

10. *Sanicula saxatilis* Greene. Rock or Diablo Sanicle. Fig. 3479.

Sanicula saxatilis Greene, Erythea 1: 6. 1893.

Stems many, about 1–2 dm. long, spreading from the base, from a large globose or somewhat irregular tuber. Leaves ternate, then 1–2-pinnate, coarsely to finely dissected, the ultimate divisions acute; flowering branches repeatedly dichotomous; flowers salmon-colored; sterile flowers on pedicels 3–6 mm. long; fruit 2.5–3 mm. long; strongly tuberculate, the upper tubercles bearing short, subulate bristles; seed-face plane.

A local species known only from the summits of the Diablo and Hamilton Ranges, central California. Type locality: summit of Mount Diablo. May–June.

11. *Sanicula tuberosa* Torr. Tuberous Sanicle. Fig. 3480.

Sanicula tuberosa Torr. Pacif. R. Rep. 4: 91. 1857.

Stems simple or branched near the base, 1–7.5 dm. high, from a globose tuber. Leaves 1–2-ternate, then pinnate, the ultimate divisions small; umbel 3-rayed; bracts foliaceous; bractlets small, united; flowers yellow, the sterile long-pedicellate; fruit 1.5–2 mm. long, tuberculate and not at all bristly; seed-face plane to slightly concave.

Open, gravelly or rocky slopes, Upper Sonoran and Transition Zones; Coast Ranges and Sierra Nevada, southwestern Oregon to southern California. Type locality: Duffield's Ranch, Sierra Nevada, California. March–July.

5. *APIÁSTRUM* Nutt. in Torr. & Gray, Fl. N. Amer. 1: 643. 1840.

Slender glabrous branching annuals. Leaves finely dissected, with filiform or linear segments. Umbels naked, unequally few-rayed. Sepals obsolete. Corolla white. Fruit ellipsoid-cordate, with obscure or obsolete ribs, more or less papillate-roughened; pericarp thin. Stylopodium depressed; styles short. Oil-tubes solitary in the intervals and beneath the ribs, 2 on the commissural side. Seed-face narrowly concave or shallowly sulcate. [Name Latin, meaning wild celery.]

A monotypic Californian genus.

1. *Apiastrum angustifolium* Nutt. Wild Celery. Fig. 3481.

Helosciadium leptophyllum var. ? *latifolium* Hook. & Arn. Bot. Beechey 347. 1838.

Apiastrum angustifolium Nutt. in Torr. & Gray, Fl. N. Amer. 1: 644. 1840.

Plants very slender, 0.5–5 dm. high, usually much branched. Leaves 1–5 cm. long, ternately dissected with linear-filiform to oblong divisions; umbels sessile; rays unequal, 1–5 cm. long; pedicels 0–15 mm. long; fruit with a narrow commissure, cordate at base, 1–1.5 mm. long.

Sandy soils, Upper Sonoran Zone; North Coast Ranges and the foothills of the Sierra Nevada to northern Lower California. Type locality: San Diego, California. March–May.

6. *CAÛCALIS* L. Sp. Pl. 240. 1753.

Mostly hispid annuals with pinnately dissected, decompound leaves and white flowers. Sepals evident. Fruit ovoid or oblong, flattened laterally. Carpel with 5 filiform bristly ribs and 4 prominent winged secondary ones, with barbed or hooked bristles. Stylopodium thick, conical. Oil-tubes solitary under the secondary ribs, 2 on the commissural side. Seed-face deeply sulcate. [The ancient classical name.]

A genus of 5 species, natives of Asia, southern Europe, northern Africa and North and Central America. Type species, *Caucalis microcarpa* Hook. & Arn.

1. *Caucalis microcarpa* Hook. & Arn. California Hedge-parsley. Fig. 3482.

Caucalis microcarpa Hook. & Arn. Bot. Beechey 348. 1838.

Daucus brachiatus Torr. Pacif. R. Rep. 4: 93. 1857.

Annual, more or less hispid, the stems slender, erect, 0.8–4 dm. high. Leaves pinnately decompound into small segments; umbels unequally 1–9-rayed; bracts foliaceous, pinnately decompound; rays slender, 1–8 cm. long; pedicels very unequal; fruit oblong, 3–7 mm. long, armed with rows of hooked prickles.

Sandy or rocky soils, Upper Sonoran Zone; eastern British Columbia to southern California, east to Idaho, Utah, Arizona and Mexico. Type locality: California. April–June.



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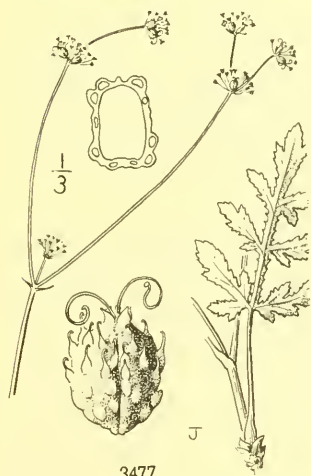
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3471. *Sanicula arguta*
 3472. *Sanicula nevadensis*
 3473. *Sanicula crassicaulis*

3474. *Sanicula maritima*
 3475. *Sanicula laciniata*
 3476. *Sanicula bipinnatifida*

3477. *Sanicula Peckiana*
 3478. *Sanicula bipinnatifida*
 3479. *Sanicula saxatilis*

7. *TÓRILIS* Adans. Fam. Pl. 2: 99, 612. 1763.

Hispid or pubescent annual herbs with pinnately compound leaves and compound umbels of white flowers. Bracts of the involucre when present few and small; bractlets several to numerous, narrow. Sepals triangular, acute. Stylopodium thick, conical. Fruit ovoid or oblong, laterally flattened; primary ribs 5, filiform; secondary ribs 4, winged, each bearing a row of barbed or hooked bristles or tubercles; oil-tubes solitary under the secondary ribs, 2 on the commissural side. [Significance of the name unknown.]

A genus of about 20 species, natives of the northern hemisphere. Type species, *Tordylium Anthriscus* L.
 Umbels sessile or short-pedunculate, capitate, opposite the leaves.
 Umbels long-pedunculate, spreading, terminal and lateral.

1. *T. nodosa*.
2. *T. japonica*.

1. *Torilis nodòsa* (L.) Gaertn. Knotted Hedge-parsley. Fig. 3483.

Tordylium nodosum L. Sp. Pl. 240. 1753.

Torilis nodosa Gaertn. Fruct. 1: 82, pl. 20. fig. 6. 1788.

Stems erect with few branches, retrorsely scabrous. Leaves pinnately decomposed; umbels scattered along the stems opposite the leaves on very short peduncles, simple or with supplementary short proliferous umbels; fruit 3–5 mm. long, the outside of the umbel with the exterior carpel densely covered with hooked bristles, the inner carpel as well as the inner fruits smooth or with tubercles.

Partial shade, Transition and Upper Sonoran Zones; Oregon to California. Naturalized from Europe. April–June.

2. *Torilis japónica* (Houtt.) DC. Japanese Hedge-parsley. Fig. 3484.

Tordylium Anthriscus L. Sp. Pl. 240. 1753.

Caucalis japonica Houtt. Nat. Hist. II. 8: 42. pl. 45. fig. 1. 1777.

Torilis Anthriscus Gmel. F. Bad. 1: 615. 1805. Not Gaertn. 1788, nor Bernh. 1800.

Torilis japonica DC. Prod. 4: 219. 1830.

Plants hispid throughout. Leaves 1–2-pinnate, the leaflets dentate to incised or divided; peduncles 4–16 cm. long, exceeding the leaves; fruit 1.5–4 mm. long; the pericarp covered throughout with uncinat bristles.

Transition and Sonoran Zones; Oregon to California. Naturalized from Eurasia. April–July.

Torilis arvensis (Huds.) Link, Enum. Hort. Berol. 1: 265. 1821. (*Caucalis arvensis* Huds. Fl. Angl. 98. 1762.) Differs from *T. japonica* in its usual lack of an involucre, and its longer and straight fruit-bristles. Introduced from Europe into southwestern Oregon and northwestern California.

8. *ANTHRÍSCUS* Hoffm. Gen. Umbell. 38. 1814. Nomen conservandum.

Annual or biennial herbs, with ternately or pinnately compound leaves. Flowers white in compound umbels. Involucre usually none; involucre of numerous bractlets. Sepals none or minute. Fruit ovoid to linear, beaked, laterally compressed; ribs and oil-tubes obsolete. Seed-face sulcate. [Ancient Greek name.]

An Old World genus of about 10 species. Type species, *Caucalis Scandix* Scop.

1. *Anthriscus scandicìna* (Weber) Mansfeld. Bur-chervil. Fig. 3485.

Scandix Anthriscus L. Sp. Pl. 257. 1753.

Caucalis Scandix Scop. Fl. Carn. ed. 2. 1: 191. 1772.

Caucalis scandicina Weber ex Wiggers, Prim. Fl. Holsat. 23. 1780.

Anthriscus vulgaris Pers. Syn. Pl. 1: 320. 1805. Not *A. vulgaris* Bernh. 1800.

Anthriscus scandicina Mansfeld. Rep. Spec. Nov. 46: 309. 1939.

Annual herbs, more or less hispid throughout, the rather slender stems 4.5–9 dm. high. Leaves pinnately decomposed, the stipules densely ciliate; umbels usually 3–6-rayed; involucre none or of a single small bract; bractlets small, lanceolate; pedicels 2–9 mm. long; flowers white; fruit ovoid, 4 mm. long, including the short beak, muricate with short hooked bristles.

Shaded waste places and banks; western Oregon to central California. Naturalized from Europe. April–June.

9. *SCÁNDIX* [Tourn.] L. Sp. Pl. 256. 1753.

Annual herbs with pinnately decomposed leaves and white flowers in compound umbels, the umbels sometimes reduced to a single ray. Involucral bracts none or rarely one; involucre of several entire or dissected bractlets. Sepals minute or obsolete. Petals usually unequal, the outer larger. Fruit linear or narrowly oblong, flattened laterally, prolonged into an elongated beak much exceeding the body of the fruit, prominently ribbed; oil-tubes solitary in the intervals or obsolete. [The ancient Greek name for chervil.]

An Old World genus of about 10 species. Type species, *Scandix Pecten-Veneris* L.

1. *Scandix Pécten-Véneris* L. Venus'- or Lady's-comb or Shepherd's-needle. Fig. 3486.

Scandix Pecten-Veneris L. Sp. Pl. 256. 1753.

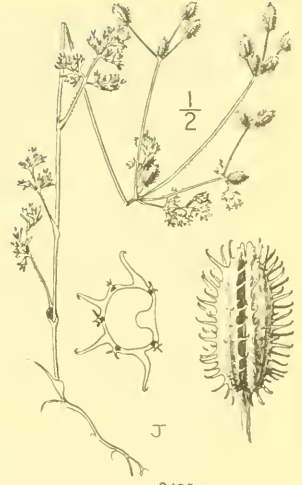
Plants hispid, the stems 15–35 cm. high with ascending branches. Leaves pinnately decom-



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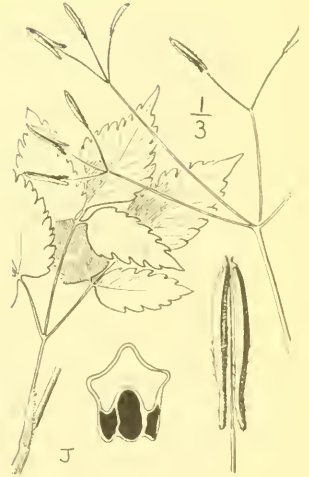
3485



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3486. *Scandix Pecten-Veneris*

3487. *Osmorhiza occidentalis*

3488. *Osmorhiza purpurea*

3480. *Sanicula tuberosa*
3481. *Apiastrum angustifolium*
3482. *Caulis microcarpa*

3483. *Torilis nodosa*
3484. *Torilis japonica*
3485. *Anthriscus scandicina*

pound, the lower long-petiolate; ultimate divisions scarcely 1 mm. wide, acute; involucre of a single foliaceous bract; bractlets several, lanceolate, entire or 2-3-lobed at the apex, ciliate; pedicels very short; fruit 6-15 mm. long, the beak 2-7 cm. long, about 2 mm. wide, flat and straight with short ascending hairs on the edges.

Waste places, naturalized from Europe or Asia; Vancouver Island to southern California and throughout the United States. April-June.

10. *OSMORHIZA* Raf. Journ. Phys. 89: 257. 1819.

Slender to rather stout, caulescent, pubescent to glabrate perennials. Leaves ternate or ternate-pinnate; leaf-divisions lanceolate to orbicular, serrate to pinnately lobed. Involucre none or of a few foliaceous bracts. Rays few, slender, ascending to divaricate and reflexed, unequal. Bractlets few, narrow, reflexed, or none. Flowers white, purple or greenish yellow. Sepals obsolete. Stylopodium conical. Fruit linear-oblong, linear-fusiform or clavate, obtuse, tapering, beaked or constricted at apex, rounded or caudate at base, flattened laterally, bristly hispid to glabrous; ribs filiform, acute, often bristly. Oil-tubes obscure or none; seed-face sulcate. [Name from two Greek words meaning smell and root.]

A genus of about 12 species, natives of North America, western South America and eastern Asia. Type species, *Myrrhis Claytonii* Michx.

Fruit glabrous or sparsely bristly toward base, obtuse at base, not caudate; rays ascending to spreading-ascending. 1. *O. occidentalis*.

Fruit bristly hispid, caudate at base with conspicuous tails; rays spreading-ascending to divaricate and reflexed. Involucel wanting; flowers greenish, white or purple.

Rays and pedicels spreading-ascending; fruit linear-oblong, cylindrical.

Flowers purplish or greenish; styles 0.5-1 mm. long; fruit 10-13 mm. long, constricted at apex. 2. *O. purpurea*.

Flowers greenish white or white; styles 0.2-0.5 mm. long; fruit 12-20 mm. long, tapering at apex. 3. *O. chilensis*.

Rays and pedicels divaricate; fruit clavate. 4. *O. obtusa*.

Involucel present; flowers greenish yellow. 5. *O. brachypoda*.

1. *Osmorhiza occidentalis* (Nutt.) Torr. Western Sweet-cicely. Fig. 3487.

Glycosma occidentalis Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 639. 1840.

Osmorhiza occidentalis Torr. Bot. Mex. Bound. 71. 1859.

Myrrhis Bolanderi A. Gray, Proc. Amer. Acad. 7: 346. 1868.

Glycosma ambiguum A. Gray, Proc. Amer. Acad. 8: 386. 1872.

Plants rather stout, 3-12 dm. high, villous at the nodes and pilosulous to glabrate throughout. Leaves oblong to ovate, 10-20 cm. long, 1-3-ternate or ternate-pinnate; leaf-divisions oblong-lanceolate to ovate, 2-10 cm. long, serrate and usually incised or lobed; rays 5-12, stiffly ascending to spreading-ascending, 2-13 cm. long; bractlets usually none; pedicels spreading to ascending, 3-8 mm. long; flowers yellow; styles 1 mm. long or less; fruit linear-fusiform, 12-20 mm. long, constricted below apex, obtuse at base, glabrous or rarely sparsely bristly toward base.

Woods, Transition and Boreal Zones; British Columbia and central California east to Alberta and Colorado. Type locality: "western side of the Blue Mountains of Oregon." May-July.

2. *Osmorhiza purpurea* (Coul. & Rose) Suksd. Purple Sweet-cicely. Fig. 3488.

Washingtonia purpurea Coul. & Rose, Contr. U.S. Nat. Herb. 7: 67. 1900.

Washingtonia Leibergii Coul. & Rose, op. cit. 66.

Osmorhiza purpurea Suksd. Allg. Bot. Zeit. 12: 5. 1906.

Plants slender, 2-6 dm. high, sparingly hispidulous to glabrous. Leaves deltoid or orbicular, 3-10 cm. long, 1-3-ternate; leaf-divisions lanceolate or ovate, 1.5-7 cm. long, coarsely serrate to incised or lobed; bractlets wanting; rays 2-6, spreading-ascending, 2-7.5 cm. long; pedicels spreading-ascending, 5-20 mm. long; flowers purplish or greenish; styles 0.5-1 mm. long; fruit linear-fusiform, 10-13 mm. long, constricted below the short-beaked apex, hispid toward base and caudate at base.

Woods, Boreal Zones; Alaska south to Washington and Oregon and Del Norte County, California; also northern Montana and Idaho. Type locality: Sitka, Alaska. June-July.

3. *Osmorhiza chilensis* Hook. & Arn. Mountain Sweet-cicely. Fig. 3489.

Osmorhiza chilensis Hook. & Arn. Bot. Beechey 26. 1830; Hook. Bot. Miscel. 3: 355. 1833.

Osmorhiza Berteri DC. Prod. 4: 232. (September) 1830.

Osmorhiza divaricata Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 639. 1840. (Nomen nudum)

Osmorhiza nuda Torr. Pacif. R. Rep. 41: 93. 1857.

Washingtonia brevipes Coul. & Rose, Contr. U.S. Nat. Herb. 7: 66. 1900.

Plants slender, 3-10 dm. high, hispid, the younger parts densely so. Leaves orbicular, 5-15 cm. long, biternate; leaf-divisions ovate-lanceolate to orbicular, 2-6 cm. long, coarsely serrate, incised or lobed; bractlets none; rays 3-8, spreading-ascending, 2-12 cm. long; pedicels spreading-ascending, 5-30 mm. long; flowers greenish white; styles 0.2-0.5 mm. long; fruit linear-

oblong, 12–20 mm. long, tapering toward apex into a slender beak, caudate and densely hispid at base.

Woods, Transition and Boreal Zones; Alaska south to California and Arizona, eastward to Newfoundland and New Hampshire; also southern Argentina and Chile. Type locality: "Concepcion," Chile. April–July.

4. *Osmorhiza obtusa* (Coul. & Rose) Fernald. Blunt-fruited Sweet-cicely. Fig. 3490.

Washingtonia obtusa Coul. & Rose, Contr. U.S. Nat. Herb. 7: 64. 1900.

Osmorhiza obtusa Fernald, Rhodora 4: 154. 1902.

Plants slender, 1.5–6.5 dm. high, the foliage hispid to glabrate. Leaves orbicular, 4–11 cm. long, biternate or ternate-pinnate; leaf-divisions broadly lanceolate to ovate, 1.5–5 cm. long, coarsely serrate, incised or lobed; bractlets wanting; rays 2–5, widely divergent or some reflexed, 2–7 cm. long; pedicels 2–5, widely divergent, 1–3 cm. long; flowers greenish white; styles minute; fruit clavate, 10–15 mm. long, obtuse or abruptly acute at apex, caudate and densely hispid at base.

Woods, Transition and Boreal Zones; eastern Washington to northeastern California, eastward to Labrador and Vermont, Colorado and Arizona; also southern Argentina and Chile. Type locality: Ishawood Creek, northwestern Wyoming. May–June.

5. *Osmorhiza brachypoda* Torr. California Sweet-cicely. Fig. 3491.

Osmorhiza brachypoda Torr. ex Durand, Journ. Acad. Phila. II. 3: 89. 1855.

Osmorhiza brachypoda var. *fraterna* Jepson, Fl. Calif. 2: 670. 1936.

Plants rather stout, 3–8 dm. long, short-pilose. Leaves ovate or deltoid, 8–25 cm. long, ternate-pinnate; leaf-divisions ovate, 2–6 cm. long, coarsely serrate, incised and pinnately lobed toward the base, pilose or strigose; bractlets several, linear or lanceolate, ciliate, spreading or reflexed, exceeding the pedicels; rays 2–5, spreading-ascending, 2.5–10 cm. long; pedicels ascending, 1–3 mm. long; flowers greenish yellow; styles about 0.5 mm. long; fruit oblong-fusiform, 12–20 mm. long, tapering into a narrow beak at apex, caudate at base, short-hispid on the conspicuous ribs.

Woods, Transition Zone; central to southern California and Arizona. Type locality: "near the banks of Deer Creek," Nevada City, California. March–May.

11. **AMMOSELINUM** Torr. & Gray, Pacif. R. Rep. 2⁴: 165. 1855.

Low branching annuals with ternately dissected leaves, the ultimate divisions linear or spatulate. Flowers white, in sessile or peduncled compound umbels. Involucre absent or present; involuclers of a few linear or divided bractlets. Sepals obsolete. Fruit oblong-ovoid to ovoid, flattened laterally; ribs prominent, tuberculate or spinulose-tuberculate; oil-tubes solitary in the intervals or in our species 3; stylopodium conical, styles short. [Name Greek, meaning sand-parsley.]

A genus of 3 species of the southwestern United States and Mexico. Type species, *Ammoselinum Popei* Torr. & Gray.

1. *Ammoselinum giganteum* Coul. & Rose. Western Sand-parsley. Fig. 3492.

Ammoselinum giganteum Coul. & Rose, Contr. U.S. Nat. Herb. 7: 89. 1900.

Ammoselinum occidentale Munz & Jtn. Bull. Torrey Club 52: 224. 1925.

Stems solitary or several from the base, 10–20 cm. high. Leaves glabrous, 1.5–2.5 cm. long, ternate-pinnately dissected, the divisions linear, 4–13 mm. long; peduncles axillary and terminal; bractlets few, linear-lanceolate; rays several, unequal, 0–22 mm. long; pedicels unequal, 1–8 mm. long; fruit oblong-ovoid, 3–5 mm. long, closely beset with callous teeth; oil-tubes 3 in the intervals, 2 on the commissure.

Desert basins, Lower Sonoran Zone; southern California to Arizona and Coahuila. Type locality: mesas near Phoenix, Arizona. April.

12. **DAUCUS** L. Sp. Pl. 242. 1753.

Pubescent caulescent annuals or biennials. Leaves pinnately decomposed. Involucre of foliaceous, pinnately divided bracts; involuclers of many entire or divided bractlets. Inflorescence compact in fruit. Flowers usually white. Sepals obsolete to evident. Fruit ovoid to oblong, flattened dorsally. Carpels with slender bristly primary ribs and winged secondary ribs bearing a single row of barbed or glochidiate prickles. Oil-tubes solitary in the intervals, 2 on the commissural side. Seed flattened dorsally, the face somewhat concave. [The ancient Greek name.]

A genus of about 25 species of wide distribution, one native in the United States. Type species, *Daucus Carota* L.

Bracts divided into short linear or lanceolate segments; central flower of the umbel white; plants annual.
1. *D. pusillus*.

Bracts divided into elongate filiform segments; central flower of the umbel usually pink or purple; plants biennial.
2. *D. Carota*.

1. *Daucus pusillus* Michx. Rattlesnake Weed. Fig. 3493.

Daucus pusillus Michx. Fl. Bor. Amer. 1: 164. 1803.

Plants annual from long slender more or less fibrous branching roots. Leaves finely dissected into linear divisions 1–5 mm. long; bracts equaling to exceeding the rays, pinnately divided into short linear or lanceolate segments; bractlets linear, about equaling the pedicels; rays 0.4–4 cm. long; flowers white; fruit oblong, 3–5 mm. long.

Open hillsides and valleys, Upper Sonoran and Transition Zones; Vancouver Island to Lower California east to North and South Carolina. Type locality: "in campestribus Carolinae." April–June.

2. *Daucus Caròta* L. Wild Carrot or Queen Anne's Lace. Fig. 3494.

Daucus Carota L. Sp. Pl. 242. 1753.

Plants biennial from slender fusiform taproots. Leaves finely dissected into linear or lanceolate segments 2–12 mm. long; bracts shorter than the rays, pinnately divided into elongated filiform divisions; bractlets linear, equaling to exceeding the pedicels; rays 3–7.5 cm. long; flowers white, yellow or pinkish, the central flower of the umbel purple or pink; fruit ovoid, 3–4 mm. long.

Introduced from Europe and well established in western Washington and Oregon, less so in California. May–Sept.

13. *CORIÁNDRUM* [Tourn.] L. Sp. Pl. 256. 1753.

Annual herbs with pinnately decompound leaves. Flowers white or roseate in compound umbels. Involucre wanting. Involucels of a few narrow bractlets. Fruit subglobose, hard, not constricted at the commissure, the ribs slender. Stylopodium conical; styles slender. Oil-tubes obscure. [The ancient Latin name.]

A genus of 2 species of the warm temperate and subtropical regions of the Old World. Type species, *Coriandrum sativum* L.

1. *Coriándrum sativum* L. Coriander. Fig. 3495.

Coriandrum sativum L. Sp. Pl. 256. 1753.

Glabrous annual 2–7 dm. high. Lower leaves ternately or pinnately divided, the segments ovate or obovate, toothed or cleft; upper leaves decompound with narrowly linear divisions; umbels 3–5 cm. broad; rays slender; pedicels 2–5 mm. long; involucre none; involucels with small linear-lanceolate bractlets; fruit subglobose, 1.5–5 mm. long, the ribs narrow, acute.

A garden plant, occasionally escaped from cultivation. Native of southern Europe. May–July.

14. *ÀPIUM* L. Sp. Pl. 264. 1753.

Glabrous annual, biennial or perennial herbs with pinnate to ternate-pinnately decompound leaves. Flowers white or greenish yellow, in compound umbels. Sepals obsolete. Stylopodium depressed or low-conical. Fruit ovoid to ellipsoid, laterally compressed, smooth or tuberculate. Carpels usually with prominent ribs and somewhat 5-angled; oil-tubes generally solitary in the intervals, 2 on the commissural side. [The ancient Latin name.]

A genus principally of Eurasia and the southern hemisphere, of some 30 species. Type species, *Apium graveolens* L.

Plants annual; leaves pinnately or ternate-pinnately decompound, divisions linear to filiform.

1. *A. leptophyllum*.

Plants perennial; leaves pinnate, divisions ovate to suborbicular or cuneate.

2. *A. graveolens*.

1. *Apium leptophýllum* (Pers.) F. Muell. Marsh-parsley. Fig. 3496.

Sison Ammi Jacq. Hort. Vindob. 2: 95. pl. 200. 1773. Not *S. Ammi* L. 1753.

Pimpinella leptophylla Pers. Syn. Pl. 1: 324. 1805.

Apium leptophyllum F. Muell. ex Benth. & Muell. Fl. Austr. 3: 372. 1866.

Apium Ammi Urb. ex Mart. Fl. Bras. 11: 341. 1879. Not *A. Ammi* Crantz. 1767.

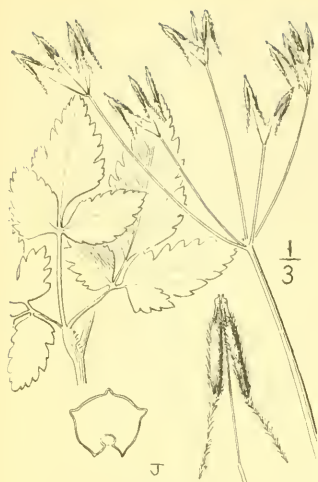
Stems prostrate to suberect, 0.5–6 dm. high, branching. Basal leaves 3–4-pinnately decompound, 3.5–8 cm. broad, petiolate, the upper smaller, ternate-pinnately decompound, short-petiolate; leaf-divisions linear to filiform, 4–35 mm. long; umbels opposite the leaves or terminal, 3–5-rayed; bracts and bractlets wanting; pedicels 2–8 mm. long; flowers minute, white; fruit ovoid, 1.2–3 mm. long.

Humboldt County, California, probably introduced; widespread in southeastern United States, West Indies and South America; also in Europe and Asia. Type locality: Santo Domingo, West Indies.

2. *Apium graveòlens* L. Celery or Smallage. Fig. 3497.

Apium graveolens L. Sp. Pl. 264. 1753.

Stems erect, 5–15 dm. high, branching. Basal leaves pinnate, 1–6 dm. long, petiolate, the upper much reduced, pinnate, nearly sessile; leaf-divisions 3–5, sessile or petiolulate, 2–4.5 cm. long, broadly ovate to oval or cuneate, coarsely toothed and incised; umbels opposite the leaves



3489



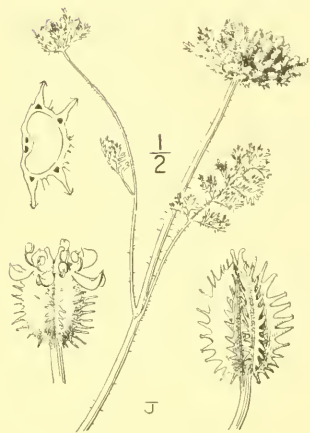
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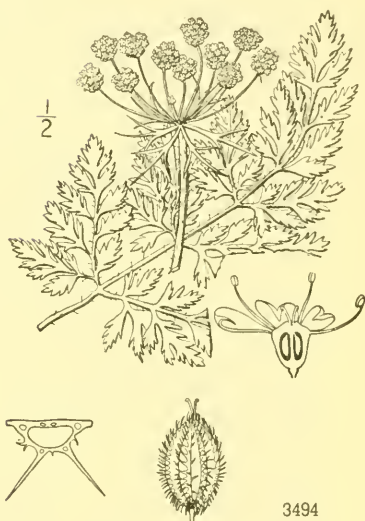
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3489. *Osmorhiza chilensis*
3490. *Osmorhiza obtusa*
3491. *Osmorhiza brachypoda*

3492. *Ammoselinum giganteum*
3493. *Daucus pusillus*
3494. *Daucus Carota*

3495. *Coriandrum sativum*
3496. *Apium leptophyllum*
3497. *Apium graveolens*

or terminal; 7-16-rayed; bracts and bractlets wanting; pedicels 1-6 mm. long; flowers minute, white; fruit suborbicular to ellipsoid, about 1.5 mm. long, the ribs slightly winged.

Salt marshes and wet places, California. Escaped from cultivation. Native of Europe. May-July.

15. *PETROSELINUM* Hoffm. Gen. Umbell. 78. 1814.

Slender, caulescent, glabrous biennials from taproots. Leaves ternate-pinnately or pinnately decomposed; ultimate divisions ovate to linear, toothed or lobed. Involucre inconspicuous or wanting. Rays few to numerous. Bractlets several, linear. Flowers yellow or greenish yellow. Sepals obsolete. Stylopodium low-conical; styles short. Fruit ovoid to oblong, flattened laterally, glabrous; ribs prominent, filiform. [Name Greek from words meaning rock and parsley.]

A Eurasian genus of 3 species. Type species, *Apium Petroselinum* L.

1. *Petroselinum crispum* (Mill.) Mansfeld. Parsley. Fig. 3498.

Apium Petroselinum L. Sp. Pl. 264. 1753.

Apium crispum Mill. Gard. Dict. ed. 8. no. 2. 1768.

Petroselinum hortense Hoffm. Gen. Umbell. 163. 1814. (Nomen nudum)

Petroselinum sativum Hoffm. op. cit. 177. (Nomen nudum)

Petroselinum crispum Mansfeld, Rep. Spec. Nov. 46: 307. 1939.

Plants 3-13 dm. high. Leaves deltoid; ultimate divisions ovate-lanceolate to linear, 2-5 cm. long, toothed or lobed; bracts inconspicuous or none; rays 10-20, 1-5 cm. long; bractlets 5-6, linear, acute, shorter than the flowers; fruit ovoid-oblong, 2-4 mm. long.

In waste places; introduced in the Pacific States and throughout the world from Europe.

16. *AMMI* L. Sp. Pl. 243. 1753.

Slender, erect, caulescent annuals or biennials, essentially glabrous. Leaves ternate-pinnately or pinnately dissected, the ultimate divisions lanceolate to filiform. Bracts numerous, entire or divided. Bractlets entire, shorter or longer than the pedicels. Flowers white. Sepals obscure. Stylopodium depressed-conical. Fruit ovoid-oblong to oblong, flattened laterally, glabrous, the ribs acute. [The ancient Latin name.]

A genus of 6 species, natives of southern Europe and northern Africa. Type species, *Ammi majus* L.

Inflorescence borne on a discoid receptacle; umbels compact in fruit.

1. *A. Visnaga*.

Inflorescence not borne on a discoid receptacle; umbels spreading in fruit.

2. *A. majus*.

1. *Ammi Visnaga* (L.) Lam. Toothpick Ammi or Bishop's-weed. Fig. 3499.

Daucus Visnaga L. Sp. Pl. 242. 1753.

Ammi Visnaga Lam. Fl. Franc. 3: 462. 1778.

Erect, glabrous, 2-8 dm. high. Leaves deltoid, 5-20 cm. long, pinnately decomposed, the ultimate divisions linear to filiform, 5-35 mm. long; cauline leaves ternately or pinnately dissected; bracts equaling to exceeding the rays; bractlets numerous, entire, equaling or exceeding the pedicels; rays 60-100, subfiliform, unequal, 2-5 cm. long, spreading in flower but becoming rigidly contracted in fruit, borne on a discoid receptacle; pedicels similar to the rays, also borne on a disk; fruit oblong-ovoid to ovoid, 2-2.5 mm. long.

Waste places, introduced from Eurasia into Oregon and California, also in the southeastern United States. June-July.

2. *Ammi majus* L. Larger Bishop's-weed. Fig. 3500.

Ammi majus L. Sp. Pl. 243. 1753.

Apium Ammi Crantz, Stirp. Austr. ed. 1. 3: 109. 1767.

Erect, 2-8 dm. high, the inflorescence scabrous. Leaves oblong, 6-20 cm. long, ternate or pinnate, the leaf-divisions lanceolate, setulose-serrate; cauline leaves bipinnate, the divisions linear; bracts exceeding the rays; bractlets numerous, entire, shorter than the pedicels; rays 50-60, subfiliform, 2-7 cm. long, spreading to ascending in flower, spreading in fruit; pedicels similar to the rays; fruit oblong, 1.5-2 mm. long.

Introduced from Eurasia into Oregon and California, also in the southeastern United States. July.

17. *CÖNIUM* L. Sp. Pl. 243. 1753.

Tall biennial glabrous poisonous herbs with spotted stems and pinnately decomposed leaves. Flowers small, white, in compound many-rayed umbels. Involucre and involuclers of ovate acuminate bracts and bractlets. Sepals obsolete. Fruit broadly ovoid, glabrous, somewhat flattened laterally. Carpels with prominent, undulate ribs; oil-tubes obscure, a layer of oil-secreting tissue next to the deeply sulcate seed. [From the Greek name of the poison hemlock.]

A genus of 2 species, the following, which is the type, native of Eurasia, the other South African.

1. *Conium maculatum* L. Poison Hemlock. Fig. 3501.

Conium maculatum L. Sp. Pl. 243. 1753.

Stems erect, much branched, 5-30 dm. high. Lower and basal leaves petiolate, the upper sessile or nearly so, all pinnately dissected; leaf-divisions ovate in outline, thin, the ultimate divisions dentate or incised; petioles dilated and sheathing at the base; umbels 2.5-7.5 cm. broad; rays slender, 2.5-4 cm. long; pedicels filiform, in fruit 4-6 mm. long; fruit 2-2.5 mm. long, its ribs very prominent when dry.

Waste places, especially in damp ground, widely distributed in the Pacific States and eastward to the Atlantic seaboard. Naturalized from Europe. May-July.

18. *BÉRULA* Hoffm. ex Bess. Enum. Pl. Vollh. 44. 1822.

Smooth aquatic perennial herbs with pinnate leaves, variously cut leaflets, and small white flowers. Sepals minute. Fruit flattened laterally, emarginate at base, glabrous. Stylopodium conical; carpel nearly globose, with very slender inconspicuous ribs, thick corky pericarp and no strengthening cells. Oil-tubes numerous and contiguous, closely surrounding the seed-cavity. Seed terete. [Latin name of the water-cress.]

A monotypic genus of the north temperate regions.

1. *Berula erecta* (Huds.) Coville. Cut-leaved Water Parsnip. Fig. 3502.

Sium erectum Huds. Fl. Angl. 103. 1762.

Sium angustifolium L. Sp. Pl. ed. 2. 1672. 1763.

Sium pusillum Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 611. 1840.

Berula erecta Coville, Contr. U.S. Nat. Herb. 4: 115. 1893.

Stems erect, 2-8 dm. high, rather stout and much branched. Leaflets 5-9 pairs, oblong and subentire to serrate, often laciniate-lobed, sometimes crenate, 1.5-4 cm. long; rays 6-15, 1-2 cm. long; bracts usually conspicuous; bractlets narrow; pedicels 2-5 mm. long; fruit scarcely 2 mm. long, the ribs inconspicuous.

Marshes and streams, Transition and Upper Sonoran Zones; British Columbia south to Lower California and east to Ontario, Illinois and New Mexico; also in Eurasia. Type locality: England. July-Sept.

19. *SĪUM* L. Sp. Pl. 251. 1753.

Glabrous perennials growing in water or in wet places. Leaves pinnate to pinnately decompound. Involucre and involucrels of numerous narrow bracts and bractlets. Sepals minute. Flowers white. Fruit flattened laterally, oval to orbicular, glabrous. Carpel with prominent corky nearly equal ribs. Stylopodium depressed; styles short. Oil-tubes 1-3 in the intervals. Seeds subterete, with plane face. [Greek name of a marsh plant.]

About 8 species, natives of the north temperate regions, and South Africa. Type species, *Sium latifolium* L.

1. *Sium suave* Walt. Hemlock Water Parsnip. Fig. 3503.

Sium suave Walt. Fl. Car. 115. 1788.

Sium cicutae-folium Schrank, Baier. Fl. 1: 558. 1789.

Sium heterophyllum Greene, Pittonia 2: 102. 1890.

Stems erect, stout, branched, 6-12 dm. high. Lower leaves long-petiolate, the uppermost subsessile; leaf-divisions of submerged leaves pectinately dissected, the others, linear to lanceolate, sharply serrate, 1-4 cm. long; rays 10-20, 15-30 mm. long; fruit oval to orbicular, 2-3 mm. long, the ribs prominent.

Marshes, Canadian to Sonoran Zones; British Columbia to central California, east to Nova Scotia and Florida. July-Aug.

20. *CÀRUM* L. Sp. Pl. 263. 1753.

Slender, caulescent, branching biennials or perennials from taproots. Leaves pinnately dissected, the divisions narrow to filiform. Involucre of a few bracts or wanting. Bractlets like the bracts. Flowers white. Sepals obsolete; stylopodium low-conical. Fruit oblong to oblong-oval, flattened laterally, glabrous; ribs prominent, filiform. Seed-face plane. [Name Latin, probably derived from the country Caria.]

A Eurasian genus of about 50 species. Type species, *Carum Carvi* L.

1. *Carum Càrvi* L. Caraway. Fig. 3504.

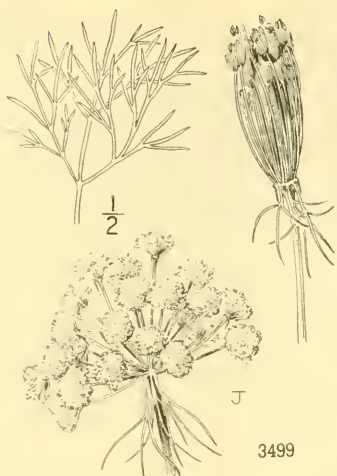
Carum Carvi L. Sp. Pl. 263. 1753.

Glabrous biennials, 3-10 dm. high. Leaves oblong to ovate, 8-15 cm. long, pinnately dissected; leaf-divisions ovate, laciniately cleft; rays 7-14, unequal, 1-5 cm. long; pedicels 3-13 mm. long; flowers white or rarely rose-colored; fruit oblong-oval, 3-4 mm. long.

Introduced from Europe, and occurring sporadically throughout the northern United States, from Washington to the Atlantic coast. June-July.



3498



3499



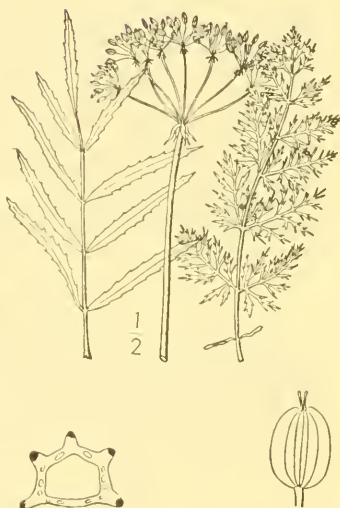
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3506

3498. *Petroselinum crispum*
 3499. *Ammi Vismaga*
 3500. *Ammi majus*

3501. *Conium maculatum*
 3502. *Berula erecta*
 3503. *Sium suave*

3504. *Carum Carvi*
 3505. *Perideridia Howellii*
 3506. *Perideridia Kelloggii*

21. *PERIDERIDIA* Reichb. Handb. 219. 1837.

Slender or stout, caulescent, branching, glabrous perennials from tuberous or fusiform fascicled roots. Leaves ternately, pinnately or ternate-pinnately compound, with ovate to linear divisions. Flowers in compound umbels, white to pinkish. Involucre of few to numerous, entire, narrow, more or less scarious bracts; involucre of usually scarious or colored bractlets. Sepals evident. Fruit flattened laterally; carpels with filiform ribs; stylopodium conical or low-conical; oil-tubes 1-5 in the intervals, 2-8 on the commissure. Seed subterete, the face plane or broadly concave.

A genus of about 9 species, one in the eastern United States, the others native to western North America. The tuberous roots of several species formed a staple food of various Indian tribes. Type species, *Eulophus americanus* Nutt.

Styles short, usually less than 1 mm. long, stout, erect or divaricate; plants coarse, from fascicles of numerous fibrous or slightly thickened roots.

Leaves ternate-pinnately dissected; leaf-divisions ovate or ovate-lanceolate, 5-25 mm. broad; seed becoming free from the pericarp. 1. *P. Howellii*.

Leaves pinnately dissected; leaf-divisions linear or lanceolate, 1-6 mm. broad; seed remaining attached to pericarp. 2. *P. Kelloggii*.

Styles elongate, filiform, reflexed; plants usually more slender, from solitary tubers or fascicles of a few tuberous roots.

Basal leaves 1-2-pinnate or 1-2-ternate, the petioles and rachis not dilated, leaf-divisions all alike.

Fruit orbicular to suborbicular, 2-3 mm. long, 1.5-2.5 mm. broad; bractlets usually setaceous.

3. *P. Gairdneri*.

Fruit oblong to ovoid, 2.5-3.5 mm. long, 1.5-2.5 mm. broad; bractlets scarious or scarious-margined, often conspicuous.

Fruit usually rounded at base and apex; oil-tubes solitary in the intervals; Washington, Oregon and northern California. 4. *P. oregana*.

Fruit usually narrowed at base and apex; oil-tubes 2-4 in the intervals; central and southern California, Nevada and Arizona. 5. *P. Parishii*.

Basal leaves ternate-pinnately or pinnately decomposed, the petioles and rachis dilated, leaf-divisions usually dimorphic.

Rays 10-20, 1-2.5 cm. long, forming small, compact umbels.

6. *P. Bolanderi*.

Rays 5-12, 3-8 cm. long, forming large, loose umbels.

Fruit 4-6 mm. long; oil-tubes several in the intervals.

7. *P. Pringlei*.

Fruit 6-8 mm. long; oil-tubes solitary in the intervals.

8. *P. californica*.

1. *Perideridia Howellii* (Coul. & Rose) Mathias. Howell's Yampah. Fig. 3505.

Carum Howellii Coul. & Rose, Rev. N. Amer. Umbell. 129. 1888.

Perideridia Howellii Mathias, Brittonia 2: 244. 1936.

Plants stout, about 1 m. high, from a fascicle of thickened fusiform roots. Leaves few, 1-2-pinnate; leaf-divisions ovate-lanceolate to ovate, deeply toothed or lobed, 2-4 cm. long, umbels many-rayed; involucre bracts several, 1-2 cm. long, narrowly oblanceolate, becoming reflexed; bractlets prominent, scarious-margined; rays 3-6 cm. long; pedicels 4-8 mm. long; fruit oblong, 3-6 mm. long, stylopodium prominent; ribs acute, oil-tubes very large, solitary in the intervals, 2 on the commissure.

Moist mountain slopes and meadows, Transition Zone; southern Oregon to Mendocino County, California. Type locality: Grants Pass, Oregon. July-Aug.

2. *Perideridia Kelloggii* (A. Gray) Mathias. Kellogg's Yampah. Fig. 3506.

Carum Kelloggii A. Gray, Proc. Amer. Acad. 7: 344. 1868.

Perideridia Kelloggii Mathias, Brittonia 2: 244. 1936.

Plants stout, 7-15 dm. tall, from a fascicle of fibrous or slightly thickened roots. Leaves once or twice ternate-pinnate; leaf-divisions linear to lanceolate, entire, 3-12 cm. long; involucre of several linear to linear-lanceolate, scarious, reflexed bracts; rays 10-20, 1.5-6.5 cm. long; bractlets linear to lanceolate, scarious, reflexed; pedicels 2-6 mm. long; styles about 0.5 mm. long; fruit oblong, 4-5 mm. long; oil-tubes solitary in the intervals, 2 on the commissure.

Moist places, Arid Transition and Upper Sonoran Zones; Sierra Nevada and Coast Ranges of northern and central California. Type locality: San Jose, Santa Clara County, California. July-Aug.

3. *Perideridia Gairdneri* (Hook. & Arn.) Mathias. Gairdner's Yampah. Fig. 3507.

Ataenia Gairdneri Hook. & Arn. Bot. Beechey 349. 1838.

Carum erythrorhizum Piper, Proc. Biol. Soc. Wash. 29: 100. 1916.

Perideridia Gairdneri Mathias, Brittonia 2: 244. 1936.

Plants slender, 3-12 dm. tall, from a solitary fusiform tuber or a small fascicle of tubers. Leaves pinnate or occasionally bipinnate; leaf-divisions linear or rarely lanceolate, 2-15 cm. long, entire or rarely lobed or toothed; involucre absent, or of one to several setaceous bracts; rays 8-20, 1.5-6 cm. long; bractlets several, linear, green or scarious; pedicels 3-7 mm. long; styles about 1 mm. long; fruit orbicular to suborbicular, 2-3 mm. long; oil-tubes solitary in the intervals, 2 on the commissure.

Wet, heavy soil, Boreal, Transition and Upper Sonoran Zones; British Columbia and Washington, through the Coast Ranges to southern California, east to Alberta and New Mexico. Type locality: California. This plant is apparently the "yampah" of the Klamath Indians, or the "yarhah" of the Shoshones. June-July. False or Indian Caraway.

4. *Perideridia oregana* (S. Wats.) Mathias. Oregon Yampah. Fig. 3508.

Endosmia oregana Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 612, as synonym. 1840.

Carum oreganum S. Wats. Proc. Amer. Acad. 20: 368. 1885.

Perideridia oregana Mathias, Brittonia 2: 243. 1936.

Plants slender, 3–6 dm. tall, from a fascicle of fusiform or ovoid tubers. Leaves 1–2-ternate or ternate-pinnate; leaflets linear to narrowly lanceolate, 1.5–6.5 cm. long, the terminal often elongate; involucre of several linear to lanceolate, scarious bracts; rays 6–20, 1–3 cm. long; bractlets conspicuous, scarious, linear to lanceolate; pedicels 2–5 mm. long; styles 1–1.5 mm. long; fruit oblong-ovoid, 2.5–3.5 mm. long; oil-tubes solitary in the intervals, 2 on the commissure.

Moist meadows, Boreal and Humid Transition Zones; western Washington to northern California. Type locality: "Wappatoo [Suavies] Island," at the mouth of the Willamette River, Oregon. July–Aug.

5. *Perideridia Parishii* (Coul. & Rose.) Nels. & Macbr. Parish's Yampah. Fig. 3509.

Carum Gairdneri var. *latifolium* A. Gray, Proc. Amer. Acad. 7: 344. 1868.

Pimpinella Parishii Coul. & Rose, Bot. Gaz. 12: 157. 1887.

Eulophus Parishii var. *Rusbyi* Coul. & Rose, Bot. Gaz. 14: 281. 1889.

Carum Lemmonii Coul. & Rose, op. cit. 283.

Eulophus simplex Coul. & Rose, Contr. U.S. Nat. Herb. 7: 112. 1900.

Perideridia Parishii Nels. & Macbr. Bot. Gaz. 61: 33. 1916.

Plants slender, 2–8 dm. tall, from a solitary tuber or a fascicle of fusiform or ovoid tubers. Leaves ternate, or sometimes simple or biternate; leaf-divisions linear to lanceolate, 2–10 cm. long, the terminal often elongate; involucre usually absent; rays 8–15, unequal, 1–4 cm. long; bractlets conspicuous, linear to obovate, scarious or colored; pedicels 3–8 mm. long; styles 1–3 mm. long; fruit oblong to ovoid, 2.5–3.5 mm. long; oil-tubes 2–4 in the intervals, 6 on the commissure.

Moist meadows, Boreal Zones; Sierra Nevada, to southern California, eastward to Nevada and Arizona. Type locality: Bear Valley, San Bernardino Mountains, California. July–Sept.

6. *Perideridia Bolanderi* (A. Gray) Nels. & Macbr. Bolander's Yampah. Fig. 3510.

Podosciadium Bolanderi A. Gray, Proc. Amer. Acad. 7: 346. 1868.

Perideridia Bolanderi Nels. & Macbr. Bot. Gaz. 61: 33. 1916.

Eulophus Bolanderi var. *benignus* Jepson, Madroño 1: 130. 1923.

Eulophus cuspidatus Jepson, op. cit. 133.

Plants slender, 2.5–8 dm. tall, from a fascicle of fusiform tubers. Leaves ternate-pinnately dissected; leaf-divisions oblong to filiform, 0.5–3 cm. long, the terminal often elongate, 5–8 cm. long, the lateral usually lobed and toothed, the petioles and rachis somewhat inflated; involucre of 1 to several narrowly lanceolate to linear, scarious bracts; rays 10–20, 1–2.5 cm. long; bractlets narrowly lanceolate to obovate, scarious; styles 1–2 mm. long; fruit oblong, 3–5 mm. long; oil-tubes 2–5 in the intervals, 6 on the commissure.

Dry meadow lands and slopes, mainly Arid Transition Zone; eastern Oregon to the Sierra Nevada, central California east to Wyoming and Utah. Type locality: Mariposa Trail, Yosemite, California. June–Aug.

7. *Perideridia Pringlei* (Coul. & Rose) Nels. & Macbr. Pringle's Yampah. Fig. 3511.

Eulophus Pringlei Coul. & Rose, Rev. N. Amer. Umbell. 113. 1888.

Perideridia Pringlei Nels. & Macbr. Bot. Gaz. 61: 33. 1916.

Plants slender, 3–6 dm. tall, from a cluster of elongate fusiform tubers. Leaves pinnately dissected; leaf-divisions narrowly linear, 0.2–8 cm. long, the petioles and rachis broadly inflated; involucre of a few small lanceolate bracts, or absent; rays 5–8, 3–8 cm. long; bractlets several, narrowly subulate, scarious; pedicels 5–10 mm. long; styles about 1 mm. long; fruit oblong, 4–6 mm. long; oil-tubes 3–5 in the intervals, 8 on the commissure.

Canyons and open slopes, Upper Sonoran Zone; Coast Ranges and Tehachapi Mountains of central California to southern California. Type locality: California. April–July.

8. *Perideridia californica* (Torr.) Nels. & Macbr. California Yampah. Fig. 3512.

Chacrophylum ? *californicum* Torr. Pacif. R. Rep. 41: 93. 1857.

Perideridia californica Nels. & Macbr. Bot. Gaz. 61: 33. 1916.

Eulophus californicus var. *sanctorus* Jepson, Madroño 1: 130. 1923.

Plants slender, 5–10 dm. tall, from a fascicle of fusiform tubers. Leaves ternate-pinnately dissected; leaf-divisions usually dimorphic, the terminal linear, elongate, entire, 3–8 cm. long, the lateral linear to ovate, entire to pinnatifid, 0.5–3 cm. long, rachis and petioles often slightly inflated; involucre of several linear-lanceolate bracts; rays 5–10, 3–6 cm. long; bractlets lanceolate to ovate-lanceolate, scarious or colored; pedicels 5–10 mm. long; styles about 1 mm. long; fruit oblong, 6–8 mm. long; oil-tubes solitary in the intervals, 4 on the commissure.

Wet soil, Arid Transition and Upper Sonoran Zones; central California, Sierra Nevada foothills and Inner Coast Ranges. Type locality: Knights Ferry, Stanislaus County, California. June–Aug.

22. *LIGUSTICUM* L. Sp. Pl. 250. 1753.

Erect glabrous or pubescent perennial herbs from fibrous root-crowns. Leaves ternate or ternate-pinnately decompound. Umbels lateral and terminal. Involucre usually none. Involucels of linear bractlets or often wanting. Sepals small or wanting. Flowers white, pinkish or purplish. Stylopodium low-conical. Fruit slightly flattened laterally, oblong or ovoid, glabrous; lateral and dorsal ribs prominent and equal, sometimes narrowly winged; oil-tubes 1-6 in the intervals, 2-10 on the commissure; seed-face plane to deeply concave. [Name from Liguria, a province of Italy, where lovage is endemic.]

A genus, widely distributed throughout the world, particularly in the northern hemisphere, with about 9 species in North America. Type species, *Ligusticum scoticum* L.

Stems more or less leafy; plants usually stout with elongated basal leaves.

Fruit ribbed, not winged.

Fruit narrowly winged.

Leaflets ovate, irregularly cleft into few, linear-oblong divisions; cauline sheaths narrow; seed-face concave. 1. *L. apiifolium*. 5. *L. californicum*.

Leaflets lanceolate, very regularly cleft into numerous, linear divisions; cauline sheaths dilated; seed-face plane. 2. *L. Canbyi*.

Stems naked or with one much-reduced cauline leaf; plants usually slender with shorter basal leaves.

Leaves with ultimate divisions narrowly linear to filiform; stylopodium low-conical.

3. *L. filicinum tenuifolium*.

Leaves with ultimate divisions broadly oblong to ovate; stylopodium prominently conical.

4. *L. Grayi*.

1. *Ligusticum apiifolium* (Nutt.) A. Gray. Celery-leaved Lovage. Fig. 3513.

Cynapium apiifolium Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 641. 1840.

Pimpinella apiodora A. Gray, Proc. Amer. Acad. 7: 345. 1868.

Ligusticum apiifolium A. Gray, op. cit. 347.

Ligusticum apiodorum var. *Helleri* Coult. & Rose ex Mathias, Brittonia 2: 245. 1936.

Stems more or less leafy, usually stout, 3-15 dm. high, glabrous to pubescent, the inflorescence puberulent. Leaves ternate-pinnate; leaflets ovate to oblong, 1-5 cm. long, coarsely toothed to deeply pinnatifid into linear acute divisions, glabrous or slightly scabrous on the margins and veins; rays 12-20, slender, 2-5 cm. long; bractlets few, linear or lanceolate; pedicels 5-10 mm. long, sometimes puberulent; fruit oval to orbicular, 3.5-5.5 mm. long; ribs slender, not winged; oil-tubes 3-6 in the intervals, 6-8 on the commissure.

Woods, Humid Transition Zone; western Washington and Oregon to the coast of central California. Type locality: "plains of Oregon [Columbia], near the confluence of the Wahlamet [Willamette]," Oregon. June-July.

2. *Ligusticum Canbyi* Coult. & Rose. Canby's Lovage. Fig. 3514.

Pimpinella apiodora var. *nudicaulis* A. Gray, Proc. Amer. Acad. 8: 385. 1872.

Ligusticum Canbyi Coult. & Rose, Rev. N. Amer. Umbell. 86. 1888.

Ligusticum Leibergii Coult. & Rose, Contr. U.S. Nat. Herb. 7: 134. pl. 4. 1900.

Ligusticum caerulescens St. John, Fl. S.E. Wash. 297. 1937.

Plants caulescent, inflorescence puberulent or glabrate, foliage scaberrulous; stems more or less leafy, usually stout, 5-12 dm. high. Leaves ternate-pinnate; leaflets lanceolate, 3-5 cm. long, laciniately cleft into linear, acute divisions; peduncles alternate or verticillate; rays 15-30, slender, 2.5-5 cm. long; bractlets 1 to several, linear; pedicels 5-10 mm. long; fruit oval to oblong, 4-5 mm. long; ribs narrowly winged; oil-tubes 4-6 in the intervals, 6-8 on the commissure; seed-face plane.

Open slopes, Arid Transition Zone; central Washington and Blue Mountains, Oregon, east to Montana and Idaho. Type locality: near headwaters of Jocko River, Montana. June-Sept.

3. *Ligusticum filicinum* var. *tenuifolium* (S. Wats.) Math. & Const.
Fern-leaved Lovage. Fig. 3515.

Ligusticum tenuifolium S. Wats. Proc. Amer. Acad. 14: 293. 1879.

Ligusticum oregonum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 138. 1900.

Ligusticum filicinum var. *tenuifolium* Math. & Const. Bull. Torrey Club 68: 123. 1941.

Stems slender, subscapose, 2-7 dm. high, glabrous throughout. Basal leaves, including the petiole, 7-35 cm. long, ternate-pinnately compound, ultimate divisions narrowly linear, acute, 3-10 mm. long; stem-leaves much reduced, subtending the flowering branches; rays 5-15, 1.5-3 cm. long; bractlets 2-3, filiform, or wanting; pedicels 3-8 mm. long; fruit oblong, 3-5 mm. long; ribs narrowly winged; oil-tubes 3-5 in the intervals, 6-8 on the commissure.

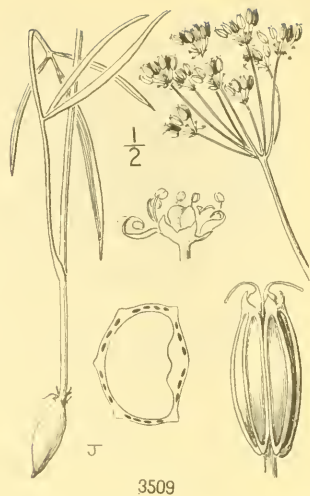
Moist places, Boreal Zones; Blue and Wallowa Mountains, northeastern Oregon, east to Montana and Colorado. Type locality: "mountains of Colorado." July-Aug.



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3515

3507. *Perideridia Gairdneri*
 3508. *Perideridia oregana*
 3509. *Perideridia Parishii*

3510. *Perideridia Bolanderi*
 3511. *Perideridia Pringlei*
 3512. *Perideridia californica*

3513. *Ligusticum apiifolium*
 3514. *Ligusticum Canbyi*
 3515. *Ligusticum filicinum*

4. *Ligusticum Grayi* Coult. & Rose. Gray's Lovage. Fig. 3516.

Ligusticum apiifolium var. *minor* A. Gray, Bot. Calif. 1: 264. 1876.

Ligusticum Grayi Coult. & Rose, Rev. N. Amer. Umbell. 88. 1888.

Ligusticum purpureum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 137. 1900.

Ligusticum Cusickii Coult. & Rose, op. cit. 138.

Ligusticum Pringlei Coult. & Rose, loc. cit.

Ligusticum tenuifolium var. *dissimilis* A. Nels. Bot. Gaz. 53: 224. 1912.

Stems naked or with one or few much-reduced cauline leaves, slender, 2-6 dm. high, glabrous throughout. Leaves ternate-pinnate; leaflets ovate to oblong, 1-2 cm. long, pinnatifid into oblong acute or obtuse divisions; rays 5-14, 2-3.5 cm. long; bractlets few, linear, setaceous; pedicels 3-8 mm. long; fruit oval-oblong, 4-6 mm. long; ribs narrowly winged; oil-tubes 3-5 in the intervals, 8 on the commissure.

Mountain meadows and open slopes, mainly Canadian Zone; Washington to the Sierra Nevada of central California, east to Nevada and Montana. Type locality: "Ostrander's Meadows," Yosemite Valley, California. June-Oct.

5. *Ligusticum californicum* Coult. & Rose. California Lovage. Fig. 3517.

Ligusticum californicum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 132. 1900.

Plants caulescent, stout, glabrous throughout. Leaves bipinnate to ternate-pinnate; leaflets ovate, 2-4 cm. long, toothed or cleft into few, linear-oblong divisions; peduncles alternate or occasionally verticillate; rays 9-20, 3-7 cm. long; bractlets several, linear; pedicels 5-11 mm. long; fruit oval, 4-6 mm. long; ribs narrowly winged; oil-tubes several in the intervals and on the commissure; seed-face concave.

Open places, Transition Zone; North Coast Ranges, California. Type locality: Covelo, Mendocino County, California. June-Aug.

23. *CICUTA* L. Sp. Pl. 255. 1753.

Caulescent, branching, glabrous perennials from a tuberous base bearing fibrous, fleshy-fibrous or tuberous roots. Leaves broad, 1-3-pinnate or ternate-pinnate, the leaf-divisions serrate to incised. Involucre wanting or inconspicuous. Rays numerous, slender, forming a convex umbel. Bractlets narrow, rarely none. Flowers white or greenish. Sepals evident. Stylopodium depressed or low-conical; styles short. Fruit oval to orbicular or ellipsoid, flattened laterally and often constricted at the commissure, glabrous; ribs usually prominent, obtuse and corky. Oil-tubes solitary in the intervals, 2 on the commissure. [The ancient Latin name.]

A circumboreal genus of about 8 poorly differentiated species. Type species, *Cicuta virosa* L.

Axils of the leaves bulbiferous; fruit usually abortive.

Axils of the leaves not bulbiferous; fruit well developed.

Oil-tubes large; seed oily, evidently channeled under the oil-tubes.

Oil-tubes small; seed less oily, terete or only slightly sulcate under the oil-tubes.

1. *C. bulbifera*.

2. *C. Bolanderi*.

3. *C. Douglasii*.

1. *Cicuta bulbifera* L. Bulb-bearing Water Hemlock. Fig. 3518.

Cicuta bulbifera L. Sp. Pl. 255. 1753.

Slender from an erect tuberous base, 3-10 dm. high, the upper leaf-axils bearing clustered bulblets. Leaves oblong to ovate, 0.5-1.5 dm. long, 2-3-pinnate; leaf-divisions linear to linear-lanceolate, 1-8 cm. long, sparsely toothed to incised; rays 1.5-2.5 cm. long; fruit rarely maturing, globose, 1.5-2 mm. long, constricted at the commissure; ribs low and broad; oil-tubes small.

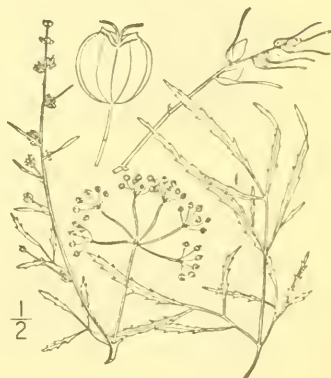
Marshes and lake borders, mainly Transition Zones; British Columbia to Klamath Lake, eastern Oregon, and east to the Atlantic coast. Type locality: "Virginia, Canada." Aug.



3516. *Ligusticum Grayi*



3517. *Ligusticum californicum*



3518. *Cicuta bulbifera*

2. *Cicuta Bolánderi* S. Wats. Bolander's Water Hemlock. Fig. 3519.

Cicuta Bolanderi S. Wats. Proc. Amer. Acad. 11: 139. 1876.

Stout, 10–30 dm. high. Leaves oblong to ovate, 1.5–3.5 dm. long, 1–2-pinnate; leaf-divisions linear to oblong-lanceolate, acuminate, 5–9 cm. long, finely to coarsely serrate; rays subequal to very unequal, 2–5 cm. long; fruit oval, 3–4 mm. long, constricted at the commissure; ribs low and corky, narrower than the broad, darker-colored intervals; oil-tubes large; seed very oily, deeply sulcate under the tubes.

Salt marshes, Upper Sonoran Zone; central and southern California. Type locality: Suisun, Solano County, California. Aug.–Sept.

3. *Cicuta Douglasii* (DC.) Coult. & Rose. Douglas' Water Hemlock. Fig. 3520.

? *Sium* ? *Douglasii* DC. Prod. 4: 125. 1830.

Cicuta californica A. Gray, Proc. Amer. Acad. 7: 344. 1868.

Cicuta occidentalis Greene, Pittonia 2: 7. 1889.

Cicuta purpurata Greene, op. cit. 8.

Cicuta vagans Greene, op. cit. 9.

Cicuta Douglasii Coult. & Rose, Contr. U.S. Nat. Herb. 7: 95. 1900.

Cicuta grandifolia Greene, Leaflets Bot. Obs. 2: 24. 1909.

Cicuta frondosa Greene, op. cit. 236. 1912.

Cicuta subfalcata Greene, op. cit. 237.

Cicuta valida Greene, op. cit. 238.

Cicuta Sonnei Greene, op. cit. 239.

Cicuta fimbriata Greene, op. cit. 240.

Stout, from a vertical or horizontal tuberous base, 6–20 dm. high. Leaves oblong to ovate, 1.2–3.8 dm. long, 1–3-pinnate; leaf-divisions linear-lanceolate to ovate-lanceolate, 3–10 cm. long, remotely to coarsely serrate or incised; bractlets several, ovate-lanceolate to linear, 2–15 mm. long; rays 2–6 cm. long; fruit ovoid to globose, 2–4 mm. long; ribs low and corky, usually broader than the reddish brown or homochromous intervals; oil-tubes small; seed not very oily, not sulcate under the tubes.

Marshes, mostly fresh-water, Upper Sonoran Zone to Canadian Zone; Alaska to California, east to Alberta, Arizona and northern Mexico. Type locality: "in America boreali occid." June–Aug.

24. *OENÁNTHE* L. Sp. Pl. 254. 1753.

Mostly aquatic glabrous herbs with succulent stems and pinnate or pinnately compound leaves. Involucres usually present. Involucels of numerous bractlets. Flowers white. Sepals rather prominent, persistent. Fruit oblong (in our species), slightly flattened laterally if at all, glabrous. Carpels semiterete with broad obtuse corky ribs; a band of strengthening cells investing the seed and oil-tubes. Stylopodium conical; styles elongate, persistent. Oil-tubes solitary in the intervals, 2 on the commissural side. Seed sulcate beneath each oil-tube. [Ancient Greek name of some thorny plant.]

About 30 species, all but the following and one Mexican species native of the Old World. Type species, *Oenanthe fistulosa* L.

1. *Oenanthe sarmentosa* Presl. Pacific or American *Oenanthe*. Fig. 3521.

Oenanthe sarmentosa Presl in DC. Prod. 4: 138. 1830.

Helosciadium californicum Hook. & Arn. Bot. Beechey 142. 1832.

Oenanthe californica S. Wats. Proc. Amer. Acad. 11: 139. 1876.

Oenanthe sarmentosa var. *californica* Coult. & Rose, Rev. N. Amer. Umbell. 92. 1888.

Stems succulent, 5–15 dm. high. Leaves bipinnate; leaf-divisions approximate, ovate, 1–6 cm. long, acuminate, toothed, often lobed at base; rays many, 1.5–3 cm. long; bracts few or none, when present linear; bractlets similar and more numerous; pedicels many, 2–6 mm. long; fruit 2.5–3.5 mm. long, the ribs very corky.

Aquatic, in sluggish streams or marshes, mainly Humid Transition Zone; British Columbia, mainly along the coast to southern California extending inland to the Willamette Valley, Oregon, and Idaho, south to the northern Sierra Nevada, California. Type locality: Nootka Sound, Vancouver Island. June–Oct.

25. *PODÍSTERA* S. Wats. Proc. Amer. Acad. 22: 475. 1887.

Dwarf caespitose perennials with once or twice pinnate leaves. Umbels compound but condensed. Involucre present or none; involucels of conspicuous, dimidiate, entire, 3–5-cleft or toothed bractlets. Flowers orange-yellow to purplish. Sepals prominent. Fruit flattened laterally, oblong-ovoid to ovoid, glabrous; ribs slender; stylopodium conical; styles slender, short or elongate; oil-tubes 2 to several in the intervals and on the commissure. [Greek meaning solid foot, in reference to the compact structure of the umbel.]

A genus of 3 species, native respectively to Alaska, Colorado and California. Type species, *Cymopterus* ? *nevadensis* A. Gray.

1. *Podistera nevadensis* (A. Gray) S. Wats. Sierra Podistera. Fig. 3522.*Cynopteris nevadensis* A. Gray, Proc. Amer. Acad. 6: 536. 1866.*Podistera nevadensis* S. Wats. Proc. Amer. Acad. 22: 475. 1887.*Podistera albensis* Jepson, Madroño 1: 140. 1923.

Plants scabrous, the caudex with numerous very short branches. Leaves tufted, 3–10 mm. long, the divisions 3–7, lanceolate, acute; peduncles 0.5–3 cm. long; bractlets ovate, 3–5-cleft; umbels congested and composed of 3–5 subsessile umbellets; fruit 1–2 mm. long.

Rocky slopes, Hudsonian Zone; summits of high mountain peaks, Sierra Nevada, White Mountains, and San Bernardino Mountains, California. Type locality: Mount Dana, Sierra Nevada. Aug.–Sept.

26. *OREONANA* Jepson, Madroño 1: 140. 1923.

Low tufted stemless plants from a stout taproot, more or less pubescent or tomentose throughout. Leaves pinnately or ternately decompound into small crowded divisions with callous margins and cuspidate tips. Umbels compound, condensed and subcapitate; involucre none; involucels one-sided. Flowers white or purplish; sepals evident. Sterile flowers on slender pedicels exceeding the rays; fertile flowers sessile. Fruit ovoid, somewhat laterally compressed; ribs filiform; oil-tubes several in the intervals and on the commissural side. [Name Greek, meaning mountain dwarf.]

A genus of 2 species, natives of the California mountains. Type species, *Oreonana californica* Jepson.

Rays membranously winged; sepals of sterile flowers conspicuous, the calyx star-shaped. 1. *O. Clementis*.

Rays not winged; sepals of sterile flowers inconspicuous. 2. *O. vestita*.

1. *Oreonana Clementis* (M. E. Jones) Jepson. Clemens' Mountain Parsley. Fig. 3523.*Drudeophytum Clementis* M. E. Jones, Contr. West. Bot. No. 14: 33. 1912.*Oreonana californica* Jepson, Madroño 1: 140. 1923.*Oreonana Clementis* Jepson, Man. Fl. Pl. Calif. 715. 1925.

Low and tufted, peduncles and leaves from the root-crown, 3–8 cm. high. Leaves, pedicels and carpels tomentose (rarely glabrate), the peduncles and petioles glabrous; umbels globose, slightly exerted beyond the leaves; rays 2–8 mm. long, membranously winged; involucels with 5 ovate-lanceolate lobes; fruit 3–4 mm. long, sessile; sepals evident; pedicels of sterile flowers about equaling the fruit.

Rocky ridges, Boreal Zones; southern Sierra Nevada, California. Type locality: Mount Whitney, California. July–Aug.

2. *Oreonana vestita* (S. Wats.) Jepson. Woolly Mountain Parsley. Fig. 3524.*Deweya vestita* S. Wats. Proc. Amer. Acad. 17: 374. 1882.*Oreonana vestita* Jepson, Madroño 1: 141. 1923.

Plants 4–15 cm. high, densely white-woolly throughout. Peduncles equaling to longer than the leaves; rays 10–20 mm. long; bractlets numerous, lanceolate-lobed; sterile pedicels 10–15 mm. long; fruit subsessile, 5–6 mm. long, pubescent; oil-tubes 3–4 in the intervals, 3 on the commissure.

Exposed rocky situations, Canadian Zone; San Gabriel and San Bernardino Mountains, southern California. Type locality: summit of Mount San Antonio (Old Baldy), San Gabriel Mountains. June–July.

27. *RHYSÓPTERUS* Coult. & Rose, Contr. U.S. Nat. Herb. 7: 185. 1900.

Low prostrate glabrous herbs, the stems slender, mostly subterranean, arising from a deep-seated woody taproot. Leaves ternate-subpinnate, coriaceous; leaf-divisions lobed or pinnatifid. Peduncles usually shorter than the leaves; involucre none; involucels usually of conspicuous and scarious bractlets. Flowers white; sepals conspicuous; stylopodium wanting. Fruit ovoid to globose, flattened laterally, glabrous; carpels flattened dorsally, boat-shaped, with 7 equal prominent corky ribs appearing crenulate-winged when young; oil-tubes small, solitary in the intervals and in the apex of each rib, 2 on the commissure. Seed-face concave. [Name Greek, meaning wrinkled wing.]

A monotypic genus of western North America.

1. *Rhysopterus plurijugus* Coult. & Rose. Rhysopterus. Fig. 3525.*Rhysopterus plurijugus* Coult. & Rose, Contr. U.S. Nat. Herb. 7: 186. 1900.

Leaves coriaceous, ovate-oblong, 10–40 mm. long, about equaling the petioles, the two lateral leaflets ternately lobed or divided, the terminal ternately divided and the divisions again ternately lobed or toothed, all the divisions about as broad as long; rays several, stout, recurved in age; bractlets frequently scarious-margined, about equaling the pedicels; fruit ovoid to orbicular, often purplish, 3–4 mm. long, all the ribs similar, wing-like and wrinkled in the young fruit.

Dry sandy ground, Upper Sonoran Zone; Malheur and Harney Counties, eastern Oregon. Type locality: Malheur Valley, near Harper Ranch, Oregon. June–July.



3519



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3521



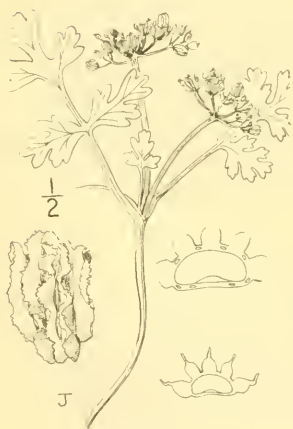
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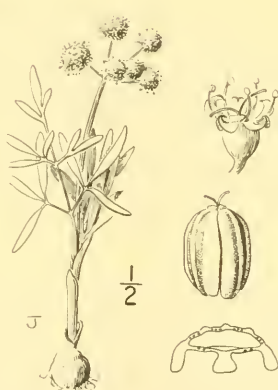
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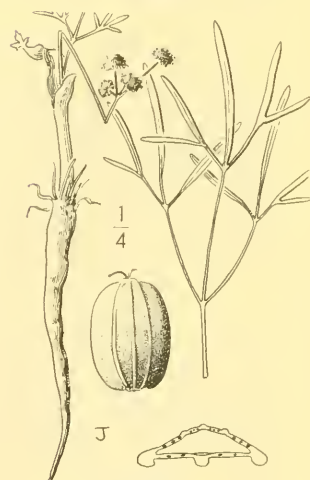
3524



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3527

3519. *Cicuta Bolanderi*
 3520. *Cicuta Douglasii*
 3521. *Oenanthe sarmentosa*

3522. *Podistera nevadensis*
 3523. *Oreonana Clementis*
 3524. *Oreonana vestita*

3525. *Rhysopterus plurijugus*
 3526. *Orogenia linearifolia*
 3527. *Orogenia fusiformis*

28. *OROGÈNIA* S. Wats. Bot. King Expl. 120. 1871.

Low glabrous nearly acaulescent perennials, with tuberous or fusiform roots, the underground portion of the stem clothed with large scarios, bladeless sheaths. Leaves 1-3-ternate, with narrow divisions. Involucre none; involucels of a few linear bractlets or none. Flowers white. Sepals minute. Fruit oblong to oval, slightly flattened laterally, with filiform dorsal ribs, the lateral corky-thickened and extending toward the other carpel. Stylopodium depressed. Oil-tubes minute, several in the intervals and on the commissural side. The commissure with a corky rib-like longitudinal projection on its face. Seed-face slightly concave. [Greek, meaning mountain race, in allusion to the habitat.]

A genus of 2 species, natives of the western United States. Type species, *Orogenia linearifolia* S. Wats.

Stems from deep-seated globose tubers; dorsal ribs prominent.

1. *O. linearifolia*.

Stems from long fusiform roots; dorsal ribs obscure.

2. *O. fusiformis*.

1. *Orogenia linearifolia* S. Wats. Great Basin Orogenia. Fig. 3526.

Orogenia linearifolia S. Wats. Bot. King Expl. 120. pl. 14. fgs. 1-3. 1871.

Orogenia linearifolia var. *lata* Payson, Bot. Gaz. 60: 379. 1915.

Stems slender, rising 5-15 cm. from a globose or ovoid tuber. Leaves 2 or 3, ovate, ternate or biternate; petioles slender; leaf-divisions 1.5-7 cm. long, entire; rays 1-4, 0.2-2.5 cm. long; flowers subsessile; fruit 3-4 mm. long, oblong-oval; dorsal ribs prominent.

Moist shaded slopes, Canadian Zone; Washington, east to Montana, south to Utah and southwestern Colorado. Type locality: damp shaded ridges, 7,500 feet altitude, Wahsatch Mountains north of Parley's Park, Utah. May-July.

2. *Orogenia fusiformis* S. Wats. California Orogenia. Fig. 3527.

Orogenia fusiformis S. Wats. Proc. Amer. Acad. 22: 474. 1887.

Resembling the preceding species, the stems rising 5-14 cm. from a fusiform tuber. Leaves ovate to deltoid, ternate to triternate; leaf-divisions 0.5-6 cm. long, the terminal often 3-parted; rays 1-8, 0.5-3 cm. long; fruit 3-4 mm. long, oval; dorsal ribs obscure or obsolete.

Mountains, Transition Zones; southern Oregon to central California. May-July.

29. *FOENÍCULUM* Adans. Fam. Pl. 2: 101. 1763.

Erect biennial or perennial glabrous and glaucous herbs, with anise odor and with pinnately compound leaves and linear or capillary leaf-divisions. Flowers yellow, in compound umbels. Involucre and involucels wanting. Sepals obsolete. Stylopodium conical. Fruit oblong, slightly flattened laterally, glabrous; ribs prominent; oil-tubes solitary in the intervals. [Diminutive of the Latin word *foenum*, hay, for its odor.]

An Old World genus of 4 species. Type species, *Anethum Foeniculum* L.

1. *Foeniculum vulgare* Mill. Sweet Fennel. Fig. 3528.

Anethum Foeniculum L. Sp. Pl. 263. 1753.

Foeniculum vulgare Mill. Gard. Dict. ed. 8. no. 1. 1768.

Perennial, branched, 9-21 dm. high. Leaves very finely pinnately dissected into capillary divisions; petioles broad, clasping; umbels large; rays 15-40, glaucous, 1-6.5 cm. long; pedicels 2-10 mm. long, slender; fruit oblong, about 3.5-4 mm. long.

Roadsides and waste places; frequent, especially in southern and central California. Naturalized from Europe. May-Sept.

30. *ZÍZIA* Koch. Pl. Umbell. Nov. Disp. 128. 1825.

Perennial herbs with usually glabrous herbage. Leaves 1-2-ternate or the basal sometimes entire. Flowers yellow in compound umbels, the central fruit of each umbellet sessile. Involucre none; involucels of several small bractlets. Sepals prominent. Fruit oval or oblong, compressed laterally, glabrous or nearly so; ribs filiform; oil-tubes solitary, with a small one under each rib. Seed-face flat. [Named in honor of I. B. Ziz, a Rhenish botanist.]

A North American genus of 4 species. Type species, *Smyrniium aurea* L.

1. *Zizia áptera* (A. Gray) Fernald. Heart-leaved Alexanders. Fig. 3529.

Zizia cordata Koch ex DC. Prod. 4: 100. 1830. Not *Smyrniium cordatum* Walt. 1788.

Thaspium trifoliatum var. *apterum* A. Gray, Man. ed. 2. 156. 1856.

Zizia aptera Fernald, Rhodora 41: 441. 1939.

Zizia aptera var. *occidentalis* Fernald, loc. cit.

Erect, branched, rather stout, 3-6 dm. high. Basal and lower leaves simple, or occasionally ternate, long-petiolate, ovate to orbicular, deeply cordate, finely crenate, 4-7 cm. long; stem-

leaves short-petiolate, ternate or quinate, the leaf-divisions ovate or oval, toothed or incised; rays 12-16, 1-3 cm. long; fruit oblong to oval, 2-4 mm. long.

Woods, mainly Transition Zone; eastern Washington and Oregon, east to the Atlantic States. Type locality: New York and New Jersey. May-June.

31. *TAÜSCHIA* Schlecht. *Linnaea* 9: 607. 1834.

Acaulescent or caulescent herbs, with pinnately or ternately divided leaves. Involucre usually absent; involucre of usually prominent bractlets. Sepals evident, or wanting. Flowers yellow, purplish or white. Fruit orbicular to linear-oblong, flattened laterally, glabrous. Carpels with 5 slender or prominent ribs. Stylopodium none. Oil-tubes solitary to several in the intervals, and 2 to several on the commissure. Seeds nearly terete, the face sulcate. [Name in honor of I. F. Tausch, European botanist of the nineteenth century.]

A genus of 20 species in western North America, Mexico and Central America. Type species, *Tauschia nudicaulis* Schlecht.

The species of this genus occurring in the Pacific States have been variously referred to *Drudeophytum*, *Deweya*, *Hesperogenia*, and *Velaea*.

Leaves simply pinnate or ternate.

Leaflets entire, linear, lanceolate or oblong-lanceolate.

Flowers yellow; involucre present; fruit suborbicular.

Flowers white; involucre none; fruit linear-oblong.

Leaflets serrate, oblong to oval.

Leaves ternate-pinnate or ternately or pinnately decompound.

Sepals obsolete.

Plants more or less scabrous, at least in the inflorescence.

Involucres conspicuous; fruit 4-7 mm. long.

Involucres inconspicuous; fruit 3-5 mm. long.

Plants glabrous and glaucous.

Sepals evident; plants glabrous.

Umbels open; fruit 5-8 mm. long.

Umbels contracted; fruit 2-4 mm. long.

1. *T. Stricklandii*.

2. *T. Hooveri*.

3. *T. arguta*.

4. *T. Hartwegii*.

5. *T. Kelloggii*.

6. *T. glauca*.

7. *T. Parishii*.

8. *T. Howellii*.

1. *Tauschia Stricklandii* (Coul. & Rose) Math. & Const. *Strickland's Tauschia*. Fig. 3530.

Hesperogenia Stricklandii Coul. & Rose, Contr. U.S. Nat. Herb. 5: 203. pl. 27. 1899.

Tauschia Stricklandii Math. & Const. Bull. Torrey Club 68: 121. 1941.

Stemless or nearly so, 10-25 cm. tall. Leaves 3 or 4, basal, without stipular bases, pinnate to ternate or biternate; leaf-divisions lanceolate, acute, 10-30 mm. long, glabrous; petioles 2-10 cm. long; peduncles 5-20 cm. long, naked or with 1 or 2 bract-like leaves; flowers yellow; rays 3-7, unequal, up to 15 mm. long; fruit suborbicular 2-2.5 mm. long, sessile or short-pedicellate; styles long, reflexed.

Mountain meadows, Boreal Zones; Mount Rainier, Washington. The only known station. Aug.-Sept.

2. *Tauschia Hooveri* Math. & Const. Hoover's *Tauschia*. Fig. 3531.

Tauschia Hooveri Math. & Const. *Madroño* 7: 65. fig. 1. 1943.

Stemless, 10-14 cm. high from a globose tuber, glabrous and glaucous. Leaves deltoid-triangular, pinnate to bipinnate; leaflets linear, acuminate, callous-tipped; petioles 2-3 cm. long; bractlets wanting; flowers white; rays 3-7, 2-10 mm. long; fruit linear-oblong, 5-7 mm. long, short-pedicellate; styles short, recurved.

"Scablands" with sagebrush, Upper Sonoran Zone; south-central Washington. Type locality: Near Cowiche, Yakima County, Washington. Feb.-April.

3. *Tauschia arguta* (Torr. & Gray) J. F. Macbride. Southern *Tauschia*. Fig. 3532.

Deweya arguta Torr. & Gray, Fl. N. Amer. 1: 641. 1840.

Velaea arguta var. *ternata* Coul. & Rose, Bot. Gaz. 14: 282. 1889.

Tauschia arguta J. F. Macbride, Contr. Gray Herb. No. 56: 32. 1918.

Stems 3-7 dm. high, or rarely nearly acaulescent. Leaves pinnate or 3-foliate by reduction; leaflets 5-7, 3-8 cm. long, oblong to oval, the lowest pair often subcordate, finely and sharply mucronate-serrate or spinulose-toothed, the terminal and lowest often 3-lobed; rays 12-25, 2-12 cm. long; pedicels 3-9 mm. long; fruit oblong, 6-9 mm. long.

Open woods and chaparral, Upper Sonoran Zone; coastal southern California and northern Lower California. Type locality: San Diego, California. April-June.

4. *Tauschia Hartwegii* (A. Gray) J. F. Macbride. Hartweg's *Tauschia*.

Fig. 3533.

Deweya Hartwegii A. Gray, Proc. Amer. Acad. 7: 342. 1868.*Tauschia Hartwegii* J. F. Macbride, Contr. Gray Herb. No. 56: 32. 1918.

Acaulescent, 3–10 dm. high, minutely scabrous throughout. Leaves 1–2-ternate-pinnate, the ultimate divisions more or less confluent; leaflets ovate, 2.5–6 cm. long, acute at base, coarsely mucronate-serrate and lobed; rays 10–30, 2–13 cm. long; bractlets linear-lanceolate to lanceolate, reflexed on one side of the umbellets; pedicels 2–7 mm. long; fruit suborbicular, 4–7 mm. long, oil-tubes 3–5 in the intervals, 6–8 on the commissural side.

Partially shaded slopes, Upper Sonoran and Transition Zones; Coast Ranges and the foothills of the Sierra Nevada of central California. Type locality: "on the Sacramento," California. April–June.

5. *Tauschia Kelloggii* (A. Gray) J. F. Macbride. Kellogg's *Tauschia*.

Fig. 3534.

Deweya Kelloggii A. Gray, Proc. Amer. Acad. 7: 343. 1868.*Tauschia Kelloggii* J. F. Macbride, Contr. Gray Herb. No. 56: 29. 1919.

Usually acaulescent, slender, 2–7 dm. high, minutely scabrous. Leaves 1–3-ternate or ternate-pinnate; leaflets oblong to ovate, 1.5–3.5 cm. long; mucronate-serrate and often 3-lobed; rays 10–20, 2–12 cm. long; bractlets small, linear; pedicels 3–15 mm. long; fruit suborbicular, 3–5 mm. long, almost as broad, notched at base; oil-tubes 2–3 in the intervals, about 6 on the commissure.

Wooded slopes, Upper Sonoran and Transition Zones; Siskiyou Mountains, southern Oregon south to central California. Type locality: Bolinas Bay, California. April–June.

6. *Tauschia glauca* (Coul. & Rose) Math. & Const. Glaucous *Tauschia*.

Fig. 3535.

Velaea glauca Coul. & Rose, Contr. U.S. Nat. Herb. 3: 321, pl. 14. 1895.*Tauschia glauca* Math. & Const. Bull. Torrey Club 68: 121. 1941.

Slender, caulescent, 2–4 dm. high, glabrous and glaucous. Basal leaves ternate-pinnate or biternate; leaf-divisions 10–17 mm. long, ovate to orbicular, cuneate at base, often 3-lobed; rays 5–12, 1–6 cm. long; bracts usually none; bractlets lanceolate; pedicels 1–3 mm. long; fruit suborbicular, 2–3 mm. long; carpophore parted below the middle.

Wooded slopes, Transition Zones; Umpqua and Rogue River regions, Oregon, and adjacent California. Type locality: Glendale, Oregon. April–June.

7. *Tauschia Parishii* (Coul. & Rose) J. F. Macbride. Parish's *Tauschia*.

Fig. 3536.

Velaea Parishii Coul. & Rose, Rev. N. Amer. Umbell. 121. 1888.*Cymopterus owenensis* M. E. Jones, Contr. West. Bot. No. 12: 26. 1908.*Tauschia Parishii* J. F. Macbride, Contr. Gray Herb. No. 56: 32. 1918.

Stemless, 1–4 dm. high, glabrous and glaucous throughout. Leaves ternate-pinnate or pinnate, the leaflets oblong to ovate, irregularly cuspidate-toothed and pinnately lobed; rays 12–18, 3–6 cm. long; bracts none; bractlets few, setaceous; pedicels 2–7 mm. long; sepals prominent; fruit oblong to oval, 5–8 mm. long; oil-tubes 4–5 in the intervals, 8–10 on the commissure.

Open pine forests, Arid Transition Zone; southern Sierra Nevada to the San Jacinto Mountains, southern California. Type locality: north side of San Bernardino Mountains, California. May–July.

8. *Tauschia Howellii* (Coul. & Rose) J. F. Macbride. Howell's *Tauschia*.

Fig. 3537.

Velaea Howellii Coul. & Rose, Rev. N. Amer. Umbell. 122. 1888.*Tauschia Howellii* J. F. Macbride, Contr. Gray Herb. No. 56: 32. 1918.

Plants short-stemmed, 5–8 cm. high, glabrous. Leaves 1 or 2, ovate, 1.5–3 cm. long, rather thick; leaflets oblong to ovate with revolute margins, irregularly toothed or lobed, the teeth pungently tipped; rays 3–5, usually with 1 or 2 sessile umbels interspersed; bracts none; bractlets resembling the leaves and forming most of the foliage of the plant; sepals prominent, pedicels up to 5 mm. long; fruit oblong, glabrous, 2–4 mm. long; oil-tubes several in the intervals and on the commissure.

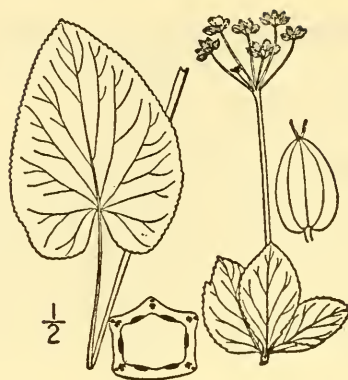
Known only from the vicinity of the type locality, the "top of Siskiyou Mountains, Oregon." June–July.

32. *OXÝPOLIS* Raf. Neogen. 2. 1825.

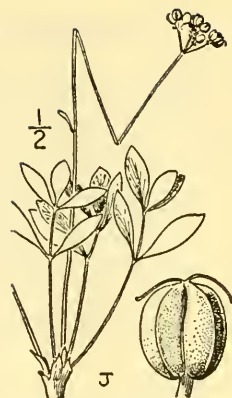
Glabrous erect aquatic herbs, with fascicled fleshy roots. Leaves pinnate or ternate or reduced to septate phyllodes. Involucre when present of few bracts; involucels of numerous small bractlets or sometimes absent. Flowers white or purple; sepals evident. Fruit strongly flattened dorsally, oblong to obovate; carpels with the dorsal ribs filiform, the lateral wings strongly nerved dorsally near the inner margin, the nerves simulating



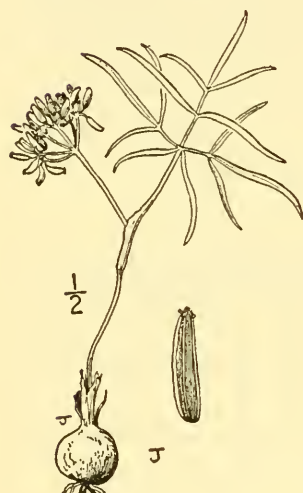
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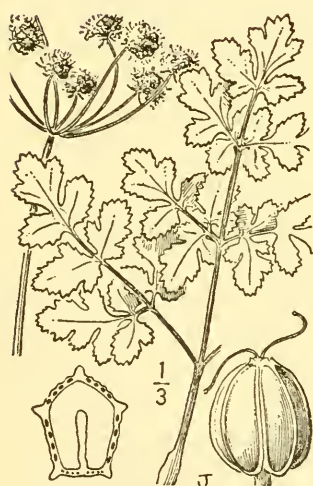
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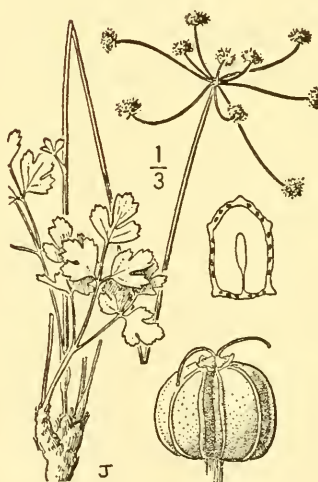
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3528. *Foeniculum vulgare*
 3529. *Zizia aptera*
 3530. *Tauschia Stricklandii*

3531. *Tauschia Hooveri*
 3532. *Tauschia arguta*
 3533. *Tauschia Hartwegii*

3534. *Tauschia Kelloggii*
 3535. *Tauschia glauca*
 3536. *Tauschia Parishii*

ribs and giving the carpel a 5-ribbed appearance. Stylopodium conical. Oil-tubes solitary in the intervals, 2-6 on the commissure. Seed-face plane.

A North American genus of about 7 species. Type species, *Sium rigidius* L.

1. *Oxypolis occidentalis* Coult. & Rose. Western Oxypolis or Cow-bane.

Fig. 3538.

Oxypolis occidentalis Coult. & Rose, Contr. U.S. Nat. Herb. 7: 196. 1900.

Plants 6-15 dm. high, the stems simple or sparingly branched. Basal leaves simply pinnate, 12-30 cm. long, their leaflets ovate to linear-lanceolate, crenate, crenate-dentate, serrate, or incised, 3.5-6.5 cm. long; stem-leaves few, the leaflets fewer, lanceolate to linear-acuminate, serrate, the uppermost reduced to the sheathing petiolar base; involucre usually of 1-2 bracts; rays 12-24, 2-8 cm. long; involucels of few linear-attenuate bractlets; fruit oval or oblong, 5-6 mm. long.

Mountain springs and bogs, Canadian and Arid Transition Zones; Cascade Mountains, southern Oregon, to the Sierra Nevada and San Bernardino Mountains, California. Type locality: Crater Lake, Oregon. July-Aug.

33. *PASTINACA* L. Sp. Pl. 262. 1753.

Tall branching glabrous or pubescent biennials or perennials. Leaves pinnately compound. Involucre and involucels small or wanting. Flowers yellow or red. Sepals obsolete. Stylopodium depressed-conical. Fruit strongly flattened dorsally, oval to obovate. Carpels with winged lateral and filiform dorsal ribs. Oil-tubes solitary in the intervals, 2-4 on the commissural side. Seed flattened dorsally, the face plane. [The ancient Latin name.]

A genus of about 14 species, natives of Eurasia. Type species, *Pastinaca sativa* L.

1. *Pastinaca sativa* L. Parsnip. Fig. 3539.

Pastinaca sativa L. Sp. Pl. 262. 1753.

Stout glabrate biennials, 3-10 dm. tall. Leaves oblong to ovate, pinnate; leaflets oblong to ovate, serrate or somewhat incised or lobed, 5-10 cm. long; rays 15-25, 2-10 cm. long; pedicels 5-10 mm. long; fruit 5-6 mm. long.

Escaped from gardens, and locally naturalized in the Pacific States. Type locality: southern Europe.

34. *ANETHUM* L. Sp. Pl. 263. 1753.

Slender glabrous and glaucous annuals, with pinnately dissected leaves and filiform leaf-divisions. Flowers yellow, in compound umbels. Involucre and involucels wanting. Sepals obsolete. Stylopodium conical. Fruit ovate, strongly flattened dorsally, glabrous; ribs narrowly winged, the lateral broader than the dorsal; oil-tubes solitary in the intervals. [The ancient name.]

An Old World genus of 2 species. Type species, *Anethum graveolens* L.



3537. *Tauschia Howellii*

3538. *Oxypolis occidentalis*

3539. *Pastinaca sativa*

1. *Anethum graveolens* L. Dill. Fig. 3540.*Anethum graveolens* L. Sp. Pl. 263. 1753.

Branching annual, 4-17 dm. high. Leaves pinnately decompose, the ultimate divisions filiform; rays 10-45, 3-10 cm. long; pedicels 6-10 mm. long; fruit ovate, about 4 mm. long.

Waste places, introduced throughout the United States. Naturalized from Europe. June-Aug.

35. *LOMATIUM* Raf. Journ. Phys. 89: 101. 1819.

Low and short-caulescent or acaulescent, or tall and caulescent, simple or branching, perennial herbs, with slender or thickened subfusiform or tuberous roots, and ternate, pinnate or decompose leaves. Flowers in compound umbels, yellow, white or purple. Involucre mostly none; involuclers present or rarely wanting. Sepals small. Fruit strongly flattened dorsally; carpels with filiform dorsal ribs, the laterals winged, thin to corky; stylopodium none; oil-tubes 1 to several in the intervals or rarely obsolete, 2-10 on the commissure. Seed flattened dorsally, the face plane or slightly concave. [From the Greek word meaning border, referring to the winged fruit.]

A genus of about 80 species, native to western North America. Type species, *Lomatium villosum* Raf.

Peduncles not conspicuously inflated at the apex, slender or uniformly fistulose, the rays sometimes dilated into a prominent disc.

Fruit more or less deeply emarginate at each end, the wings distinct on each side of the body; leaflets mostly broad in outline. I.

Fruit not emarginate or scarcely so, the wings more or less joined above and below the body; leaflets mostly narrow. II.

Plants mostly low, from globose or somewhat elongate or irregular tubers; leaves mostly small. II.

Plants usually stouter, from more or less thickened elongate taproots, sometimes with a very deep-seated tuber.

Leaves decompose, dissected into numerous small divisions.

Ovaries and young (sometimes mature) fruit variously pubescent or roughened. III.

Ovaries and fruit glabrous.

Bractlets absent. IV.

Bractlets present. V.

Leaves with mostly few or large divisions, ternately or pinnately divided, the divisions mostly remote. VI.

Peduncles conspicuously swollen and inflated at the apex.

64. *L. nudicaule*.

I.

Leaf-divisions not pinnatifid, merely toothed or sometimes 3-lobed.

Leaves 1-2-ternate; wings thickened, much broader than the body; oil-tubes solitary in the intervals; southern California. 1. *L. lucidum*.

Leaves ternate-pinnate; wings thin, about equaling to broader than the body; oil-tubes 1-3 in the intervals. Fruit broadly oval; plants mostly low; Napa and Lake Counties, California. 2. *L. repostum*.

Fruit suborbicular; plants mostly taller, southern Oregon and adjacent California. 3. *L. Howellii*.

Leaf-divisions pinnatifid, usually incised.

Leaf-blades large, longer than the petioles; fruit 12-15 mm. long; San Nicolas Island, California. 5. *L. insulare*.

Leaf-blades smaller, mostly equaling or shorter than the petioles; fruit 7-10 mm. long; California mainland.

Leaf-divisions acerose-tipped; wings less than half the width of the body; eastern slopes of the Sierra Nevada, Inyo County. 6. *L. rigidum*.

Leaf-divisions not acerose-tipped; wings broader than the body; Monterey and San Luis Obispo Counties. 4. *L. parvifolium*.

II.

Ovaries and fruit variously pubescent.

Flowers white or purple; bractlets absent or setaceous. 7. *L. Gormanii*.

Flowers yellow; bractlets distinct, obovate and connate.

Tuber deep-seated, oblong; bractlets united nearly to the apex; fruit ovate, sessile or subsessile; oil-tubes obsolete. 15. *L. Watsonii*.

Tuber globose, or occasionally elongate; bractlets distinct, obovate, scarious-margined; fruit oblong, pedicels 2-4 mm. long; oil-tubes prominent. 19. *L. Cous*.

Ovaries and fruit glabrous.

Involuclers absent or inconspicuous.

Flowers yellow; pedicels prominent, 4-25 mm. long.

Plants caulescent, alternately branched above; pedicels 4-15 mm. long.

Plants glabrous; lower leaves ternate-pinnate; fruit oblong, 8-10 mm. long. 17. *L. ambiguum*.

Plants puberulent; lower leaves 2-3-pinnate; fruit ovate-oblong, 6-7 mm. long. 18. *L. Rollinsii*.

Plants acaulescent, unbranched; pedicels 15-25 mm. long. 11. *L. Hambleniae*.

Flowers white; pedicels short or obsolete, up to 2 mm. long. 8. *L. Piperi*.

Involuclers conspicuous.

Leaf-divisions few; fruit linear, 1-1.5 mm. broad, constricted toward the apex; wings almost obsolete. 9. *L. oregonioides*.

Leaf-divisions several to many; fruit ovate to linear-oblong, 2-6 mm. broad, not constricted above; wings evident.

Bractlets linear to linear-lanceolate, sometimes more or less connate.

Leaf-divisions filiform to linear, mostly elongate, up to 8 cm. long; flowers white or yellow.

Flowers yellow; oil-tubes solitary in the intervals.

16. *L. leptocarpum*.

Flowers white; oil-tubes several in the intervals.

Bractlets distinct; pedicels lax, 6-17 mm. long.

10. *L. farinosum*.

Bractlets more or less connate; pedicels suberect, 2-5 mm. long.

12. *L. Geyeri*.

Leaf-divisions short-linear, up to 10 mm. long; flowers white.

Rays 2-6; fruit oblong-oval; wings corky, brown like the body.

13. *L. Hendersonii*.

Rays 12-17; fruit linear-oblong; wings membranaceous, lighter-colored than the body.

14. *L. Canbyi*.

Bractlets obovate, sometimes connate.

Plants acaulescent; oil-tubes 2-4 in the intervals.

20. *L. montanum*.

Plants caulescent; oil-tubes solitary in the intervals.

21. *L. circumdatum*.

III.

Bractlets oblanceolate to obovate.

Plants glabrous to pubescent, not scabrous or roughened; umbels 5-13-rayed; wings mostly broader than the body.

23. *L. utriculatum*.

Plants scabrous or roughened; umbels 10-25-rayed; wings equaling the body.

22. *L. vaginatum*.

Bractlets mostly linear, never obovate, sometimes reduced to a sheath.

Young fruit granulate-roughened, not pubescent.

31. *L. Peckianum*.

Young fruit variously pubescent, not granulate-roughened.

Bractlets with a conspicuous scarious margin, never tomentose or villous.

32. *L. nevadense*.

Bractlets not conspicuously scarious-margined, more or less tomentose or villous.

Plants acaulescent, usually low, up to 3 dm. tall.

Plants more or less villous throughout; petioles shorter than the leaf-blades.

34. *L. Macdougallii*.

Plants hoary-pubescent, never villous; petioles longer than the leaf-blades; deserts of California and adjacent Nevada.

36. *L. mohavense*.

Plants short-caulescent, rarely acaulescent, mostly taller, up to 5 dm. tall.

Petals glabrous; fruit narrowly oblong, sparingly pubescent with long hairs.

38. *L. macrocarpum*.

Petals tomentose; fruit ovate-oblong to orbicular, densely pubescent.

Pedicels mostly longer than the mature fruit; wings broader than the body, membranaceous, thinly pubescent to glabrate.

35. *L. dasycarpum*.

Pedicels mostly shorter than the mature fruit; wings narrower than to equaling the body, somewhat thickened, tomentose.

37. *L. tomentosum*.

IV.

Foliage and peduncles pubescent (or if glabrate, flowers yellow); umbels 2-7-rayed.

Foliage and peduncles glabrous (or if scaberulous, not of northern California); umbels 5-16-rayed.

Flowers white; pedicels 6-10 mm. long; central Sierra Nevada foothills, California.

39. *L. Congdonii*.

Flowers creamy white to yellow; pedicels less than 6 mm. long (except *L. angustatum* var. *flavum*).

Leaf-division filiform, 3-8 mm. long; southern Sierra Nevada, California.

40. *L. Torreyi*.

Leaf-divisions ovate, 1-2 mm. long; Coast Ranges and Cascades, British Columbia to Oregon.

42. *L. angustatum*.

V.

Bractlets obovate, sometimes connate.

Plants usually with several stem-leaves; wings broader than the body, the dorsal ribs obsolete.

Fruit ovate to obovate, 9-15 mm. long; calyx-lobes prominent in young fruit.

24. *L. Vaseyi*.

Fruit oblong to ovate, 5-11 mm. long; calyx-lobes obsolete.

23. *L. utriculatum*.

Plants without or with one stem-leaf; wings narrower than the body, or if broader, the dorsal ribs evident.

Plants glabrous or slightly pubescent; flowers yellow (or if purple, western Sierra Nevada).

20. *L. montanum*.

Plants caespitose; leaflets crowded; montane Oregon.

Plants not caespitose; leaflets distinct; California and western Oregon.

28. *L. caruifolium*.

Leaves broadly ovate to obovate; fertile rays 6-15.

Leaves oblong to ovate; fertile rays 2-5.

Bractlets entire or toothed; leaf-divisions elongate, up to 60 mm. long; California.

29. *L. humile*.

Bractlets 1-3-ternately lobed; leaf-divisions shorter, up to 8 mm. long; Willamette Valley, Oregon.

30. *L. Bradshawii*.

Plants scaberulous to densely pubescent; flowers white or purple (or if yellow, California North Coast Ranges).

Flowers purple or yellow; leaves ternate, then 1-2-pinnate; California North Coast Ranges.

25. *L. ciliolatum*.

Flowers white; leaves 3-pinnate; Sierra Nevada and Great Basin.

32. *L. nevadense*.

Bractlets filiform to linear-lanceolate, rarely oblanceolate-acuminate, never obovate.

Bractlets more or less tomentose or villous.

38. *L. macrocarpum*.

Bractlets glabrous or minutely and sparingly roughened.

Fruit 12-16 mm. long, 6-10 mm. broad; wings very narrow and corky-thickened.

43. *L. dissectum*.

Fruit 5-13 mm. long, 3-7 mm. broad; wings thin and membranaceous.

Plants more or less pubescent.

Flowers yellow; plants mostly low, less than 3 dm. tall; Great Basin.

33. *L. Plummerae*.

Flowers white; plants usually taller, up to 4.5 dm. tall.

32. *L. nevadense*.

Plants glabrous or occasionally scaberulous, never pubescent; flowers purple or yellow.

Plants acaulescent or with a pseudoscape.

Peduncles stout, fistulose; pedicels 15–25 mm. long; fruit 16–24 mm. long, 8–12 mm. broad. 44. *L. columbianum*.

Peduncles slender; pedicels 3–22 mm. long; fruit 5–7 mm. long, 3–8 mm. broad.

Leaf-divisions lanceolate to oblanceolate, minutely papillose above; bractlets finely puberulent; Snake River drainage. 49. *L. serpentinum*.

Leaf-divisions filiform, linear or linear-oblong, glabrous or scaberulous; bractlets glabrous, rarely slightly scaberulous.

Leaves oblong to ovate, 4–10 cm. long; fruit 3–5 mm. broad.

Fertile rays 8–30; pedicels 3–15 mm. long.

Fruit ovate to ovate-oblong, 4–5 mm. broad; wings less than half the width of the body; northern Great Basin. 50. *L. Donnellii*.

Fruit oblong, 3 mm. broad; wings about half the width of the body; western Oregon. 54. *L. Hallii*.

Fertile rays 1–6; pedicels 1–5 mm. long; northwestern California and southwestern Oregon. 26. *L. Tracyi*.

Leaves obovate, 6–26 cm. long; fruit 5–8 mm. broad.

Leaf-divisions remote, elongate, up to 80 mm. long; petioles wholly sheathing or nearly so; bractlets scarious-margined; California. 27. *L. marginatum*.

Leaf-divisions crowded, shorter, up to 11 mm. long; petioles sheathing only at base; bractlets not scarious-margined; Great Basin. 45. *L. Grayi*.

Plants short-caulescent.

Leaf-divisions remote, mostly elongate, up to 80 mm. long. 27. *L. marginatum*.

Leaf-divisions crowded, shorter, up to 11 mm. long.

Petioles wholly sheathing; fruit acute at the apex; east-central California and adjacent Nevada. 33. *L. Plummerae*.

Petioles partially sheathing; fruit rounded at the apex; Great Basin.

Peduncles stout, fistulose; rays stout. 47. *L. minus*.

Peduncles and rays slender.

Leaf-divisions rigid, cuspidate; flowers purple. 48. *L. cuspidatum*.

Leaf-divisions herbaceous; flowers yellow or salmon-yellow.

Fruit-wings thick, corky, colored like the body; flowers salmon-yellow. 46. *L. salmoniflorum*.

Fruit-wings thin, membranaceous, rarely obsolete, lighter-colored than the body; flowers yellow. 45. *L. Grayi*.

VI.

Plants acaulescent or short-caulescent; leaves 1–2-pinnate; rarely 3-pinnate.

Foliage pubescent.

Acaulescent; ovaries and fruit pubescent. 51. *L. oreganum*.

Caulescent, branching; ovaries and fruit glabrous. 18. *L. Rollinsii*.

Foliage glabrous.

Leaves 2–3-pinnate.

Rays subequal, suberect; pedicels 10–17 mm. long; fruit 9–12 mm. long, wings equaling or somewhat broader than the body; desert mountain ranges. 53. *L. Parryi*.

Rays unequal, spreading; pedicels 4–7 mm. long; fruit 5–7 mm. long, wings about half the width of the body; western Oregon. 54. *L. Hallii*.

Leaves pinnate, rarely bipinnate.

Plants less than 1 dm. tall; leaf-blades less than 2.5 cm. long. 52. *L. Greenmanii*.

Plants more than 1 dm. tall; leaf-blades more than 2.5 cm. long. 55. *L. Martindalei*.

Plants mostly caulescent, tall; leaves ternate-pinnately or quinate-pinnately divided.

Plants variously pubescent.

Ovaries and young fruit glabrous.

Leaves biternate; bractlets shorter than the pedicels; fruit 7–14 mm. broad, the wings equaling to broader than the body. 56. *L. simplex*.

Leaves ternate-pinnate; bractlets equaling the pedicels; fruit 3–5 mm. broad, the wings narrower than the body. 57. *L. triternatum*.

Ovaries and young fruit pubescent.

Leaves biternate; wings equaling or broader than the body. 56. *L. simplex*.

Leaves ternate-pinnate; wings narrower than the body.

Fruit 24–28 mm. long; pedicels 6–17 mm. long. 61. *L. Suksdorfii*.

Fruit 8–22 mm. long; pedicels 1–9 mm. long. 57. *L. triternatum*.

Plants glabrous or rarely slightly scaberulous, never pubescent.

Plants 9–21 dm. tall; fruit 15–32 mm. long. 61. *L. Suksdorfii*.

Plants 1–12 dm. tall; fruit 6–15 mm. long.

Plants 3–12 dm. high; leaf-divisions cuneate to obovate, 5–40 mm. broad, glaucous; southern Oregon and California. 63. *L. californicum*.

Plants 1–4 dm. high; leaf-divisions filiform to oblong or oblanceolate, 0.5–8 mm. broad, not glaucous; central and eastern Oregon and Washington.

Stems simple or occasionally few-branched; leaf-divisions filiform to oblong.

Flowers white or purplish; involucels about equaling flowers; pedicels 2–6 mm. long. 58. *L. Cusickii*.

Flowers yellow; involucels wanting or inconspicuous; pedicels 4–15 mm. long.

Leaves ternate-pinnate or partially biternate; leaf-divisions few; rays 3–7; fruit 10–12 mm. long, 3–4 mm. broad. 60. *L. idahoense*.

Leaves ternate, then 2–3-pinnate; leaf-divisions numerous; rays 9–20; fruit 6–10 mm. long, 4–6 mm. broad. 59. *L. laevigatum*.

Stems few-branched; leaf-divisions linear-lanceolate to oblanceolate; fruit usually reflexed. 62. *L. Brandegei*.

1. *Lomatium lucidum* (Nutt.) Jepson. Shiny Lomatium. Fig. 3541.

Euryptera lucida Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 629. 1840.

Peucedanum Euryptera A. Gray, Proc. Amer. Acad. 7: 348. 1868.

Peucedanum Hassei Coult. & Rose, Bot. Gaz. 14: 276. 1889.

Lomatium lucidum Jepson, Econ. Pl. Calif. 119. 1924.

Plants short-caulescent, 2.6–5 dm. tall, glabrous, from a long, slender taproot. Leaves 1–2-ternate; leaf-divisions deltoid to cuneate, regularly and sharply toothed, and often somewhat lobed, 15–70 mm. long; rays 10–20, widely spreading, 2–8.5 cm. long; bractlets linear-lanceolate, acuminate; pedicels 7–17 mm. long; flowers yellow; fruit suborbicular to broadly elliptical, emarginate at each end, 6–15 mm. long; wings thick, broader than the body; oil-tubes solitary in the intervals, 2–4 on the commissure.

Partially wooded mountain slopes, Upper Sonoran Zone; cismontane southern California, from Los Angeles County to San Diego County. Type locality: San Diego, California. Feb.–March.

2. *Lomatium repostum* (Jepson) Mathias. Napa Lomatium. Fig. 3542.

Lomatium lucidum var. *repostum* Jepson, Madroño 1: 149. 1924.

Lomatium repostum Mathias, Ann. Mo. Bot. Gard. 25: 237. 1937.

Plants acaulescent, 1.5–3.6 dm. tall, glabrous, from a long, slender, sometimes branching taproot. Leaves 1–2-ternate or ternate-pinnate; leaf-divisions ovate to subflabellate, regularly and sharply toothed, rarely shallowly lobed, 10–40 mm. long; rays 8–20, spreading, 3–8 cm. long; bractlets lanceolate, subacuminate; pedicels 8–12 mm. long; flowers greenish-yellow; fruit broadly oval, emarginate at each end, 10–15 mm. long; wings thin, equaling to much broader than the body; oil-tubes 1–3 in the intervals, 4–6 on the commissure.

Sandy or clay slopes, Arid Transition and Upper Sonoran Zones; Inner Coast Ranges, California, northern Napa and southern Lake Counties. Type locality: near Collin's Springs, Vaca Mountains, California. May–June.

3. *Lomatium Howellii* (S. Wats.) Jepson. Howell's Lomatium. Fig. 3543.

Peucedanum Howellii S. Wats. Proc. Amer. Acad. 20: 369. 1885.

Lomatium Howellii Jepson, Fl. Calif. 2: 637. 1936.

Plants acaulescent or short-caulescent, 2.5–4 dm. tall, glabrous, from a long slender branching taproot. Leaves ternate, then 1–2-pinnate; leaf-divisions deltoid, sharply and regularly toothed, sometimes lobed, 10–25 mm. long; rays 10–15, spreading, 2.5–5.5 cm. long; bractlets lanceolate to filiform; pedicels 8–12 mm. long; flowers yellow; fruit suborbicular, 7–11 mm. long, deeply emarginate at both ends; wings about equaling the body; oil-tubes 2–3 in the intervals, 9 on the commissure.

Shaded rocky slopes, Humid Transition Zone; Siskiyou Mountains, Josephine County, Oregon, to Del Norte County, California. Type locality: near Waldo, Josephine County, Oregon. May–June.

4. *Lomatium parvifolium* (Hook. & Arn.) Jepson. Small-leaved Lomatium. Fig. 3544.

Ferula parvifolia Hook & Arn. Bot. Beechey 348. 1838.

Peucedanum californicum Coult. & Rose, Bot. Gaz. 13: 143. 1888. Not *P. californicum* Nutt. 1840.

Lomatium parvifolium Jepson, Madroño 1: 150. 1924.

Plants short-caulescent, 1.5–4 dm. tall, glabrous, from a long taproot. Leaves ternate, then 1–2-pinnate; leaf-divisions lanceolate to cuneate, irregularly and sharply pinnatifid-incised, 8–24 mm. long; rays 8–14, spreading, subequal, 0.8–2.5 cm. long; bractlets linear-lanceolate to filiform; pedicels 3–6 mm. long; flowers yellow; fruit orbicular to oblong, 7–10 mm. long, emarginate at both ends; wings broader than the body; oil-tubes 1–3 in the intervals, 4–6 on the commissure.

Open pine forests, Humid Transition Zone; coastal California, Monterey County to San Luis Obispo County. Type locality: definite locality not stated, but probably near Monterey. Collected by Douglas. March–June.

Lomatium parvifolium var. *pallidum* (Coult. & Rose) Jepson, Madroño 1: 150. 1924. (*Euryptera pallida* Coult. & Rose, Contr. U.S. Nat. Herb. 7: 242. 1900.) Foliage paler; rays 3–6.5 cm. long; pedicels 7–17 mm. long. Monterey County to San Luis Obispo County, California. Type locality: Santa Lucia Mountains.

5. *Lomatium insulare* (Eastw.) Munz. San Nicolas Lomatium. Fig. 3545.

Peucedanum insulare Eastw. Proc. Calif. Acad. III. 1: 106. pl. 8. 1898.

Lomatium insulare Munz, Man. S. Calif. 358. 1935.

Plants acaulescent, 1–4 dm. tall, glabrous, from a long stout taproot. Leaves 2–3-ternate to biquinate, then pinnate; leaf-divisions oblong to ovate-oblong, cuneate, irregularly pinnatifid, 4–14 mm. long; rays 15–20, spreading, subequal, 3.5–8 cm. long; bractlets filiform; pedicels 6–12 mm. long; flowers yellow; fruit oblong-ovate, 12–15 mm. long, emarginate at both ends; wings thick, about equaling the body; oil-tubes 2 in the intervals, 4 on the commissure.

Bluffs, Upper Sonoran Zone; San Nicolas Island, southern California. Type locality: San Nicolas Island. Feb.–April.

6. *Lomatium rigidum* (M. E. Jones) Jepson. Inyo *Lomatium*. Fig. 3546.

Cogswellia rigida M. E. Jones, Contr. West. Bot. No. 13: 11. 1910.

Lomatium rigidum Jepson, Fl. Calif. 2: 637. 1936.

Plants acaulescent or short-caulescent, 2.5–4 dm. tall, glabrous, from a cluster of dried leaf-sheaths. Leaves bipinnate; leaf-divisions ovate to cuneate, sharply pinnatifid, 10–20 mm. long, the lobes with acerose or spinulose teeth; rays 10–20, spreading, subequal, 2.5–5 cm. long; bractlets lanceolate, acuminate; pedicels 5–10 mm. long; flowers yellow; sepals conspicuous; fruit ovate to oblong, 7–9 mm. long, emarginate at base, rounded at apex; wings less than half the width of the body; oil-tubes 3 in the intervals, about 6 on the commissure.

Rocky places, mainly Arid Transition Zone; eastern slopes of the Sierra Nevada, Inyo County, California. Type locality: Big Pine, Inyo County. May–July.

7. *Lomatium Gormanii* (Howell) Coult. & Rose. Gorman's *Lomatium*. Fig. 3547.

Peucedanum Gormanii Howell, Fl. N.W. Amer. 1: 252. (April 1) 1898.

Peucedanum confusum Piper, Erythea 6: 29. (April 10) 1898.

Lomatium Gormanii Coult. & Rose, Contr. U.S. Nat. Herb. 7: 208. 1900.

Plants acaulescent, 1–1.5 dm. tall, from a shallow globose tuber up to 2.5 cm. in diameter, covered with fascicles of rootlets. Leaves ternate, then 1–2-pinnate; leaf-divisions oblong to linear, 2–13 mm. long, glabrous or sparingly puberulent; rays 4–10, unequal, 0.6–3 cm. long; bractlets absent or few, setaceous, scarious-margined; pedicels 0.5–3 mm. long; flowers white or purplish, anthers purple; fruit ovate, 5–7 mm. long, puberulent; wings about half the width of the body; oil-tubes 3–4 in the intervals, 4–6 on the commissure.

Stony ground, Arid Transition and Upper Sonoran Zones; central and southeastern Washington, central Oregon, and Idaho. Type locality: "high hills opposite the Dalles," probably Klickitat County, Washington. April–June.

8. *Lomatium Piperi* Coult. & Rose. Piper's *Lomatium*. Fig. 3548.

Lomatium Piperi Coult. & Rose, Contr. U.S. Nat. Herb. 7: 211. 1900.

Plants acaulescent or short-caulescent, 1–2.5 dm. tall, glabrous or with somewhat puberulent foliage, from a small globose, sometimes deep-seated tuber. Leaves ternate, then tripinnate; leaf-divisions linear, 3–30 mm. long; rays 3–20, unequal, spreading, 1–6 cm. long; bractlets absent or few, linear; pedicels obsolete or less than 2 mm. long; flowers white, the anthers purple; fruit ovate to oblong, 5–9 mm. long, glabrous; wings about half as broad as the body; oil-tubes 1–8 in the intervals, 2–4 on the commissure.

Dry stony ground, Arid Transition Zone; central Washington to northern California, east to western Idaho. Type locality: Ellensburg, Washington. April–June.

9. *Lomatium orogenioides* (Coult. & Rose) Mathias. Leiberg's *Lomatium*. Fig. 3549.

Leibergia orogenioides Coult. & Rose, Contr. U.S. Nat. Herb. 3: 575. 1896.

Lomatium orogenioides Mathias, Ann. Mo. Bot. Gard. 25: 242. 1937.

Plants acaulescent, slender, 1–4 dm. tall, from a globose tuber 6–12 mm. in diameter. Leaves 2–3-ternate, glabrous; leaf-divisions filiform, 10–45 mm. long; rays 3–10, glabrous or sparsely scaberrulous, ascending, unequal, 3–15 cm. long; bractlets linear; pedicels 1–3 mm. long; flowers white; fruit linear, 8–10 mm. long, constricted toward the apex, glabrous; wings narrow to almost obsolete; oil-tubes solitary in the intervals, 2 on the commissure.

Damp ground along streams, Arid Transition and Canadian Zones; northeastern Washington to northern Idaho. Type locality: Santianne Creek bottoms, Coeur d'Alene Mountains, Idaho. May–July.

10. *Lomatium farinosum* (Geyer) Coult. & Rose. Coeur d'Alene *Lomatium*. Fig. 3550.

Peucedanum farinosum Geyer in Hook. Lond. Journ. Bot. 6: 235. 1847.

Lomatium farinosum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 210. 1900.

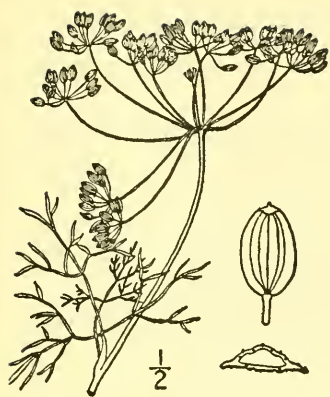
Plants short-caulescent, 1.5–3 dm. tall, glabrous, from a globose tuber 1–2 cm. in diameter. Leaves biternate; leaf-divisions linear, 1.5–8 cm. long; rays 3–12, ascending, weak, unequal, 1–7 cm. long; bractlets 1 to few, linear, acuminate, sometimes scarious, deciduous; pedicels 6–17 mm. long; flowers white; fruit linear-oblong, 5–6 mm. long; wings about half the width of the body; oil-tubes several in the intervals.

Heavy soil, among basaltic rocks, Arid Transition Zone; eastern Washington and adjacent Idaho. Type locality: Coeur d'Alene Mountains, Idaho. April–June.

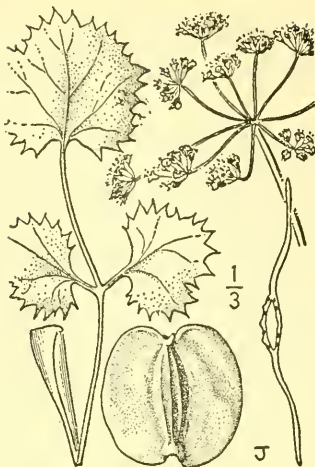
11. *Lomatium Hambléniae* Math. & Const. Hamblen's *Lomatium*. Fig. 3551.

Lomatium Hambléniae Math. & Const. Bull. Torrey Club 69: 153. 1942.

Plants acaulescent or short-caulescent, 1–3.5 dm. tall, glabrous, from a globose tuber about 1.5 cm. in diameter. Leaves 1–2-ternate, then pinnate or pinnately lobed; leaf-divisions linear, remote, 5–23 mm. long; rays 2–8, unequal, 4–8 cm. long; bractlets few, linear or lanceolate;



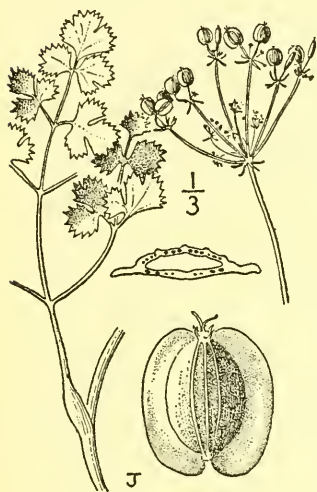
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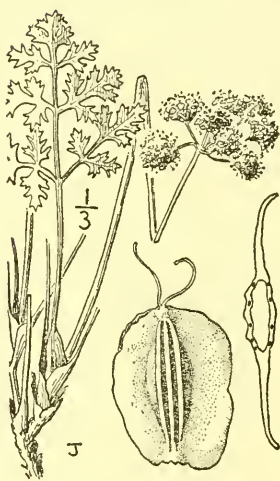
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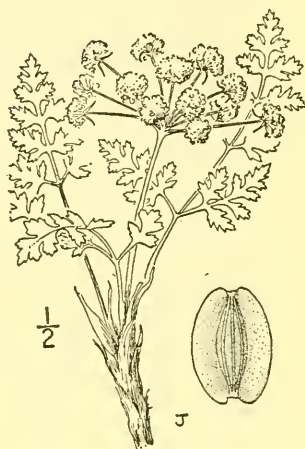
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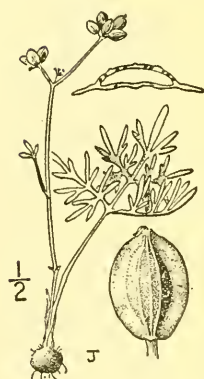
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3540. *Anethum graveolens*
3541. *Lomatium lucidum*
3542. *Lomatium repostum*

3543. *Lomatium Howellii*
3544. *Lomatium parvifolium*
3545. *Lomatium insulare*

3546. *Lomatium rigidum*
3547. *Lomatium Gormanii*
3548. *Lomatium Piperi*

pedicels 15–25 mm. long; flowers yellow; fruit oblong-ovate, 5–8 mm. long; wings much narrower than the body.

"Scablands of central Washington; Arid Transition Zone. Type locality: Dry Falls, Grand Coulee, Washington. April–May.

12. *Lomatium Geyeri* (S. Wats.) Coult. & Rose. Geyer's *Lomatium*. Fig. 3552.

Peucedanum Geyeri S. Wats. Bibl. Ind. 428. 1878.

Orogenia fusiformis var. *Leibergii* Coult. & Rose, Rev. N. Amer. Umbell. 92. 1888.

Peucedanum evittatum Coult. & Rose, Bot. Gaz. 14: 277. 1889.

Lomatium Geyeri Coult. & Rose, Contr. U.S. Nat. Herb. 7: 209. 1900.

Plants acaulescent, 2–4.5 dm. tall, glabrous, from a shallow or deep-seated small tuber less than 1 cm. in diameter. Leaves ternate, then pinnate; leaf-divisions few, remote, linear, 10–50 mm. long; rays 5–20, spreading to ascending, unequal, 1–6 cm. long; bractlets connate, linear-lanceolate, acuminate, scarious-margined; pedicels 2–5 mm. long; flowers white, anthers purple; fruit ovate-oblong, 6–13 mm. long; wings narrower than the body; oil-tubes small, obscure, 2–6 in the intervals, about 6 on the commissure.

Open woods and plains, Upper Sonoran and Arid Transition Zones; eastern British Columbia to central Washington. Type locality: "sandy woods and plains, Upper Columbia River." May–June.

13. *Lomatium Hendersønnii* Coult. & Rose. Henderson's *Lomatium*. Fig. 3553.

Peucedanum Hendersønnii Coult. & Rose, Bot. Gaz. 13: 210. 1888.

Lomatium Hendersønnii Coult. & Rose, Contr. U.S. Nat. Herb. 7: 209. 1900.

Leptotaenia Leibergii Coult. & Rose, op. cit. 202.

Plants short-caulescent, 8–25 cm. tall, glabrous, from a large shallow constricted tuber. Leaves ternate, then pinnate or bipinnate; leaf-divisions linear, 4–10 mm. long; rays 5–6, unequal, 0.5–3 cm. long; bractlets lanceolate; pedicels 2–7 mm. long; flowers "deep yellow" (appearing white in dried specimens); fruit oblong-oval, 4–8 mm. long, glabrous; wings much narrower than and the same color as the body; oil-tubes minute, solitary in the intervals, 2 on the commissure.

Stony hilltops, Arid Transition Zone; central to southeastern Oregon. Type locality: "on high hilltops, John Day Valley, Oregon." May–June.

14. *Lomatium Cánbyi* Coult. & Rose. Canby's *Lomatium*. Fig. 3554.

Peucedanum Cánbyi Coult. & Rose, Bot. Gaz. 13: 78. 1888.

Lomatium Cánbyi Coult. & Rose, Contr. U.S. Nat. Herb. 7: 210. 1900.

Plants acaulescent, 1.5–2 dm. tall, glabrous, from a thick, more or less elongated rootstock ending in a globose tuber 1–2.5 cm. in diameter. Leaves ternate, then bipinnate; leaf-divisions linear, obtuse, 4–5 mm. long; rays 12–17, spreading, subequal, 2.7–5.5 cm. long; bractlets linear, acute to subacuminate; pedicels 8–12 mm. long; flowers white; fruit oblong to oval, 7–10 mm. long; wings narrower than the body; oil-tubes 1–2 in the intervals, 2–4 on the commissure.

Stony ridges, Arid Transition and Upper Sonoran Zones; eastern Washington and Oregon to northeastern California, and western Idaho. Type locality: "high ridges, Eastern Oregon." May–June.

15. *Lomatium Watsønnii* Coult. & Rose. Watson's *Lomatium*. Fig. 3555.

Peucedanum Watsonii Coult. & Rose, Bot. Gaz. 13: 209. 1888.

Lomatium Watsonii Coult. & Rose, Contr. U.S. Nat. Herb. 7: 211. 1900.

Plants acaulescent, puberulent, 0.8–1.5 dm. tall, from a deep-seated solitary oblong tuber with clusters of rootlets on its surface. Leaves 2–4-pinnate; leaf-divisions crowded, linear, 1–5 mm. long; rays 1–9, ascending, unequal, 0.5–2.5 cm. long; bractlets scarious, dimidiate, connate to near the apex; pedicels obsolete to 1 mm. long; flowers yellow; fruit ovate, 6–7 mm. long, puberulent; wings less than half the width of the body; oil-tubes obscure, several in the intervals, about 6 on the commissure.

Dry hills, Arid Transition Zone; central Washington and the Blue Mountains, Oregon. Type locality: on denuded hilltops near "Alkali," Oregon. April–June.

16. *Lomatium leptocárpum* (Torr. & Gray) Coult. & Rose. Slender-fruited *Lomatium*. Fig. 3556.

Peucedanum triternatum var. *leptocarpum* Torr. & Gray, Fl. N. Amer. 1: 626. 1840.

Peucedanum bicolor S. Wats. Bot. King Expl. 129. 1871.

Lomatium leptocarpum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 213. 1900.

Peucedanum bicolor var. *gumbonis* M. E. Jones, Contr. West. Bot. No. 10: 55. 1902.

Plants short-caulescent, 1.5–5.5 dm. tall, glabrous to scaberulous, from elongated moniliform tuberous roots. Leaves 1–2-ternate, then 2–4-pinnate; leaf-divisions filiform to linear, 0.5–45 mm. long; rays 4–15, suberect, strict, unequal, 2–12 cm. long; bractlets linear, acute; pedicels 2–7 mm. long; flowers yellow; fruit narrowly oblong, 10–15 mm. long, glabrous; wings less than half the width of the body; oil-tubes solitary in the intervals, 2–4 on the commissure.

Dry rocky ground, Upper Sonoran and Arid Transition Zones; Blue Mountains, eastern Oregon, to northeastern California, eastward to Colorado and northern Arizona. Type locality: "plains of the Oregon near the confluence of the Wahlamet," but probably from somewhere east of the Cascades, Oregon. April–June.

17. *Lomatium ambiguum* (Nutt.) Coult. & Rose. Wyeth's Lomatium.
Fig. 3557.

Eulophus ambiguus Nutt. Journ. Acad. Phila. 7: 27. 1834.

Peucedanum tenuissimum Geyer ex Hook. Lond. Journ. Bot. 6: 235. 1847.

Peucedanum abrotanifolium Nutt. Journ. Acad. Phila. II. 1: 184. 1848.

Lomatium ambiguum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 212. 1900.

Plants caulescent, 6–44 cm. tall, glabrous, stems solitary or clustered at the base, alternately few-branched above, from tuberous somewhat moniliform roots or elongated taproots. Leaves ternate-pinnate, the upper 2–3-pinnate; leaf-divisions linear, 3–50 mm. long; rays 5–17, unequal, 15–80 mm. long; bractlets absent; pedicels 4–8 mm. long; flowers yellow; fruit narrowly oblong, 8–10 mm. long; wings very narrow; oil-tubes solitary in the intervals, 2 on the commissure.

Stony or gravelly ground, Upper Sonoran and Arid Transition Zones; eastern British Columbia to eastern Oregon, eastward to western Montana and northern Utah. Type locality: "Flat-Head River, Oregon," Montana. April–July.

18. *Lomatium Rollinsii* Math. & Const. Rollins' Lomatium. Fig. 3558.

Lomatium Rollinsii Math. & Const. Bull. Torrey Club 70: 59. 1943.

Plants caulescent, alternately branching, 2.5–5 dm. tall, from an elongate and often tuberous taproot, crisped-puberulent. Leaves bipinnate or partially 3-pinnate; leaf-divisions linear, 2–30 mm. long, puberulent; rays 4–8, ascending, 1.5–5 cm. long, unequal, puberulent; bractlets filiform, minute; pedicels 6–15 mm. long; flowers yellow; fruit oblong-ovate, 6–7 mm. long; wings half the width of the body; oil-tubes 1–2 in the intervals, 4 on the commissure.

Basaltic slopes, Upper Sonoran and Arid Transition Zones; Snake River Canyon, Oregon and Idaho. Type locality: Deep Creek, Snake River Canyon, Wallowa County, Oregon. April–May.

19. *Lomatium Couls* (S. Wats.) Coult. & Rose. Cous or Biscuit Root. Fig. 3559.

Peucedanum Cous S. Wats. Proc. Amer. Acad. 21: 453. 1886.

Lomatium Cous Coult. & Rose, Contr. U.S. Nat. Herb. 7: 214. 1900.

Plants acaulescent or short-caulescent, 2–2.5 dm. tall, from a globose, sometimes more or less elongate tuber. Leaves ternate, then 2–3-pinnate or pinnately decomposed; leaf-divisions crowded, ovate to oblong, 1–5 mm. long mostly glabrous; rays 10–20, spreading, unequal, 1–5 cm. long; bractlets oblanceolate, shortly connate below; pedicels 2–4 mm. long; flowers yellow; fruit oblong-oval, 7–10 mm. long, granulate-roughened; wings narrower than the body; oil-tubes usually solitary in the intervals, 4 on the commissure.

Rocky ridges, Arid Transition Zone; southeastern Washington and central Oregon to western Idaho. Type locality: John Day Valley, Oregon. April–June.

20. *Lomatium montanum* Coult. & Rose. Mountain Lomatium. Fig. 3560.

Lomatium montanum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 214. 1900.

Lomatium purpureum A. Nels. Bull. Torrey Club 28: 226. 1901.

Plants acaulescent, 1–3 dm. tall, glabrous, caespitose from a thickened taproot or a subglobose tuber. Leaves ternate, then 2–3-pinnate; leaf-divisions crowded, oblong, 2–10 mm. long; rays 5–15, unequal, 1–6.5 cm. long; bractlets obovate, distinct or united below, purplish; pedicels 2–3 mm. long; flowers yellow; fruit oblong to oval, 5–12 mm. long; wings narrower than to about equaling the body; oil-tubes 2–4 in the intervals, 6 on the commissure.

Mountain slopes and ridges, Arid Transition and Canadian Zones; Wallowa Mountains, eastern Oregon, to western Montana and Wyoming. Type locality: mountain ridges in Yellowstone National Park. April–June.

21. *Lomatium circumdatum* (S. Wats.) Coult. & Rose. Wallowa Lomatium.
Fig. 3561.

Peucedanum circumdatum S. Wats. Proc. Amer. Acad. 22: 474. 1887.

Lomatium circumdatum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 213. 1900.

Plants caulescent, 1.5–3.5 dm. tall, glabrous to somewhat pubescent, from an elongate to subglobose tuber. Leaves ternate, then 1–2-pinnate; leaf-divisions linear, 6–10 mm. long; rays 7–12, ascending, 2–8 cm. long; bractlets obovate, acute, prominently nerved, sometimes connate; pedicels 2–3 mm. long; flowers yellow; fruit oblong, 6–9 mm. long, glabrous; wings much narrower than the body; oil-tubes solitary in the intervals, 4 on the commissure.

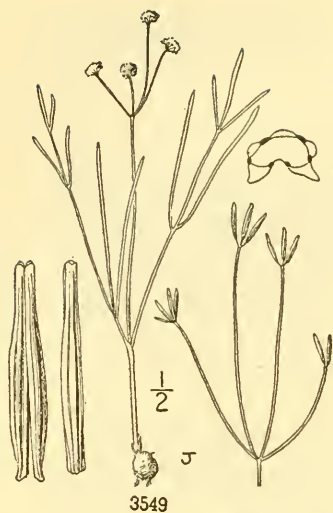
Rocky ridges, Arid Transition Zone; eastern Washington to southeastern Oregon and adjacent Idaho and Nevada. Type locality: hillsides in the Wallowa region of eastern Oregon. May–June.

22. *Lomatium vaginatum* Coult. & Rose. Vaginate or Sheathed Lomatium.
Fig. 3562.

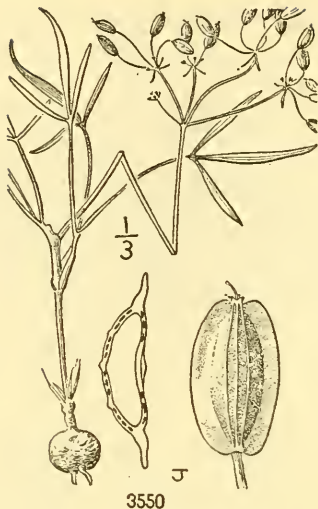
Lomatium vaginatum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 223. 1900.

Lomatium Plummerae var. *Helleri* Mathias, Ann. Mo. Bot. Gard. 25: 258. 1937.

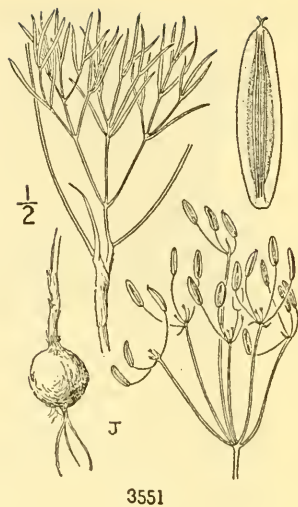
Plants caulescent, 2.3–4.5 dm. tall, scabrous, from an elongate, more or less thickened root. Leaves ternate, then 1–2-pinnate; leaf-divisions crowded, oblong, 1–5 mm. long; petioles entirely sheathing in the stem leaves; rays 6–15, ascending, unequal, 1–8 cm. long; bractlets oblanceolate to obovate, acute; pedicels 3–12 mm. long; flowers yellow; fruit broadly oval to



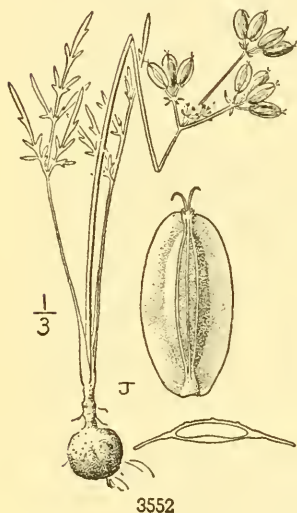
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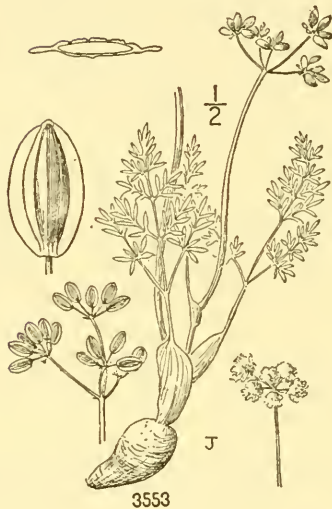
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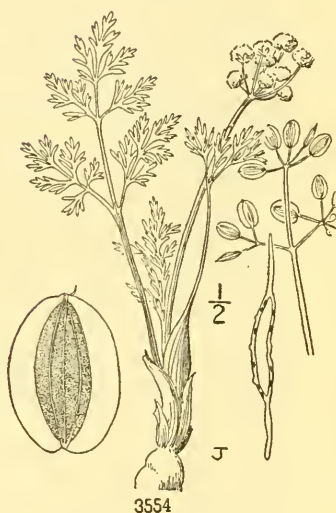
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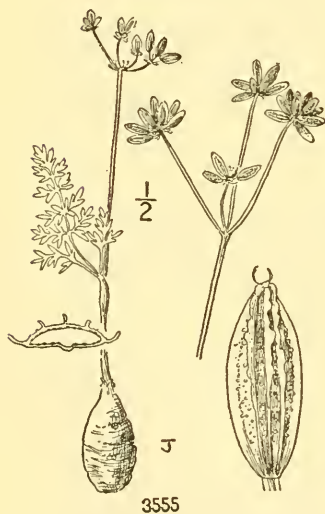
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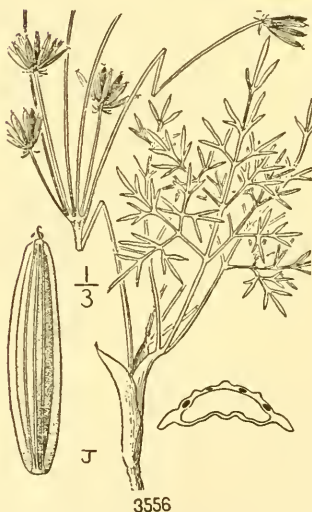
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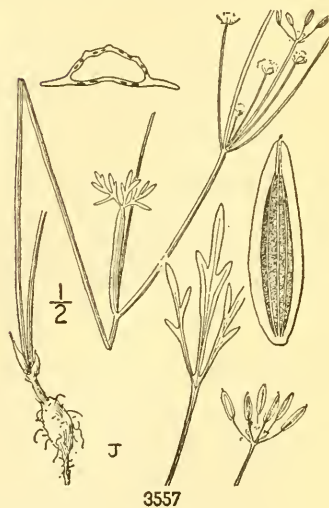
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3549. *Lomatium orogenioides*
 3550. *Lomatium farinosum*
 3551. *Lomatium Hambleniae*

3552. *Lomatium Geyeri*
 3553. *Lomatium Hendersonii*
 3554. *Lomatium Canbyi*

3555. *Lomatium Watsonii*
 3556. *Lomatium leptocarpum*
 3557. *Lomatium ambiguum*

obovate, 8–12 mm. long, granulate-roughened; wings nearly as broad as the body; oil-tubes 1–4 in the intervals, 4–5 on the commissure.

Rocky ridges, Arid Transition Zone; central Oregon to northeastern California. Type locality: Logan Valley, Union County, Oregon. May–June.

23. *Lomatium utriculatum* (Nutt.) Coult. & Rose. Common Lomatium.
Fig. 3563.

Peucedanum utriculatum Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 628. 1840.

Lomatium utriculatum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 215. 1900.

Cogswellia caruifolia var. *patens* M. E. Jones, Contr. West. Bot. No. 12: 41. 1908.

Cogswellia Chandleri M. E. Jones, Contr. West. Bot. No. 13: 11. 1910.

Lomatium utriculatum var. *glabrum* Jepson, Madroño 1: 152. 1924.

Lomatium utriculatum var. *anthemifolium* Jepson, Fl. Calif. 2: 639. 1936.

Plants caulescent, 1–5 dm. tall, glabrous to pubescent, from a long slender taproot. Leaves tripinnate, sometimes ternate, then tripinnate; leaf-divisions linear, 2–25 mm. long; petioles entirely sheathing except in some of the basal leaves; rays 5–13, spreading to ascending, unequal, 1–12 cm. long; bractlets obovate, entire or cleft, green with a scarious margin to purplish and subscarious, occasionally prominently nerved; pedicels 2–9 mm. long; flowers yellow; fruit ovate to oblong, 5–11 mm. long, puberulent when young, glabrate; wings thin, mostly broader than the body; oil-tubes 1–4 in the intervals, 2–6 on the commissure, rarely obscure.

Grassy hillsides and plains, Upper Sonoran and Transition Zones; British Columbia to southern California, west of the Cascade Mountains and Sierra Nevada. Type locality: near the mouth of the Willamette River, Oregon. March–June.

Lomatium utriculatum var. *papillatum* (Henderson) Mathias, Ann. Mo. Bot. Gard. 25: 251. 1937. (*Cogswellia utriculata* var. *papillata* Henderson, Rhodora 33: 204. 1931.) Mature fruit roughened with bud-like 1- to several-celled papillae. Southwestern Oregon. Type locality: Jackson County near the California border.

24. *Lomatium Vaseyi* Coult. & Rose. Vasey's Lomatium. Fig. 3564.

Peucedanum Vaseyi Coult. & Rose, Bot. Gaz. 13: 144. 1888.

Lomatium Vaseyi Coult. & Rose, Contr. U.S. Nat. Herb. 7: 216. 1900.

Plants caulescent, 2.5–3.5 dm. tall, pubescent with pilose hairs, from a long somewhat thickened taproot. Leaves ternate, then bipinnate; leaf-divisions oblong, 3–17 mm. long; petioles partially to wholly sheathing in the stem-leaves; rays 10–20, ascending, unequal, 2–7.5 cm. long; bractlets obovate, scarious-margined, entire or lobed toward the apex, glabrous or villosulose; pedicels 3–8 mm. long; flowers yellow; sepals prominent, especially in the young fruit; fruit ovate to obovate, 9–15 mm. long, glabrous; wings thin, usually broader than the body; oil-tubes solitary in the intervals, 4 on the commissure.

Dry, sandy or gravelly hills and plains, Upper Sonoran Zone; southern California, southern Inyo County and San Luis Obispo County, south to San Diego County. Type locality: San Bernardino Mountains, California. March–May.

25. *Lomatium ciliolatum* Jepson. Yollo Bolly Lomatium. Fig. 3565.

Lomatium ciliolatum Jepson, Madroño 1: 155. 1924.

Plants acaulescent, hoary-pubescent, about 0.9–1.6 dm. tall, from a long slender taproot. Leaves ternate, then 1–2-pinnate; leaf-divisions oblong to ovate, 0.5–2 cm. long, irregularly pinnatifid, densely hoary-pubescent throughout or only near the margins; fertile rays 2–5, unequal, 0.8–4 cm. long; bractlets obovate to lanceolate, with dark purple veins; pedicels 2–4 mm. long; flowers purple or yellow; fruit oval, 7–9 mm. long, glabrous; wings thick, much narrower than the body; oil-tubes obscure, 4–5 in the intervals, 2 on the commissure.

Rocky slopes, Boreal Zones; Inner North Coast Ranges, California. Type locality: Soldiers Ridge near South Yollo Bolly, California. June–Aug.

Lomatium ciliolatum var. *Hooveri* Math. & Const. Bull. Torrey Club 69: 153. 1942. More slender, 1.5–3 dm. tall, densely scaberulous; leaf-divisions linear, 1–10 mm. long; rays 3–10 cm. long; pedicels 3–8 mm. long; fruit-wings thin. Inner North Coast Ranges, at lower altitudes. Type locality: northern Napa County.

26. *Lomatium Tracyi* Math. & Const. Tracy's Lomatium. Fig. 3566.

Lomatium Tracyi Math. & Const. Bull. Torrey Club 69: 154. 1942.

Plants acaulescent, 1–3.5 dm. tall, glabrous to sparsely scaberulous-puberulent, from a long slender taproot. Leaves ternate, then 1–2-pinnate; leaf-divisions linear to oblong, 1–7 mm. long; fertile rays 1–6, strictly ascending, 0.5–8 cm. long, very unequal; bractlets oblanceolate to linear, acuminate, scarious-margined; pedicels 1–5 mm. long, few fertile; flowers yellow; fruit oblong-ovate to oval, 6–10 mm. long, usually acute at base and apex, glabrous; wings thin, much narrower than the body; oil-tubes obscure.

Serpentine soil, Arid Transition Zone; mountains of northwestern California to adjacent Oregon. Type locality: Grouse Mountain, Humboldt County, California. June–July.

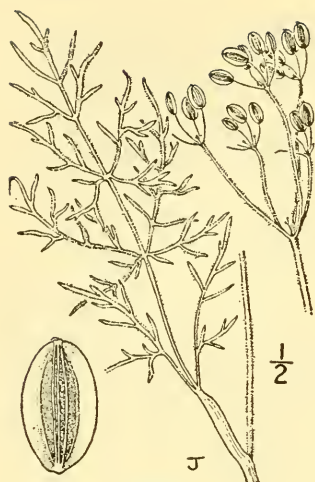
27. *Lomatium marginatum* (Benth.) Coult. & Rose. Hartweg's Lomatium.
Fig. 3567.

Peucedanum marginatum Benth. Pl. Hartw. 312. 1849.

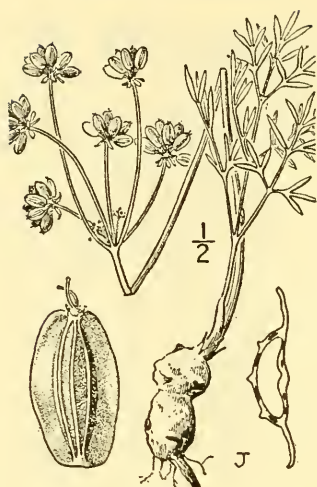
Lomatium marginatum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 223. 1900.

Lomatium alatum var. *purpureum* Jepson, Madroño 1: 158. 1924.

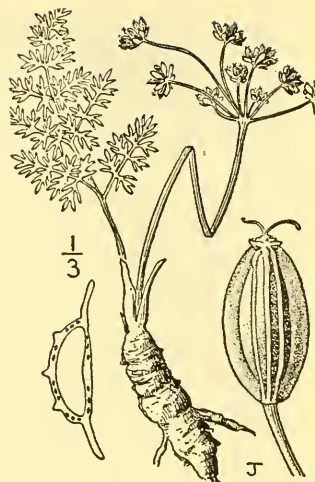
Plants acaulescent or short-aculescent, scaberulous to glabrate, 1.5–6.5 dm. tall, from a



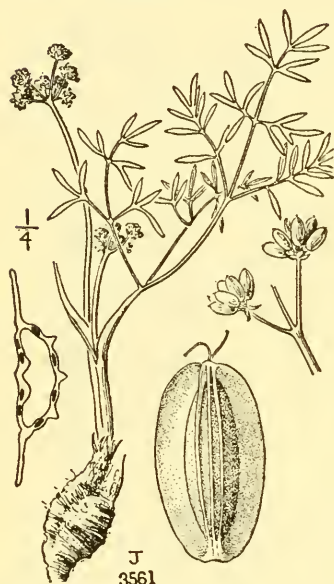
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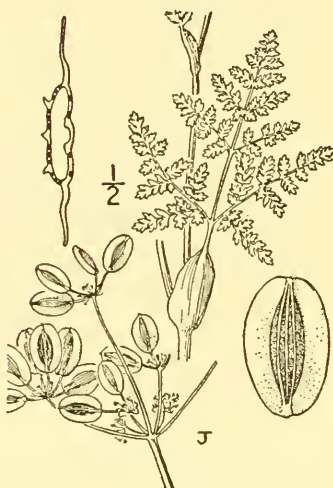
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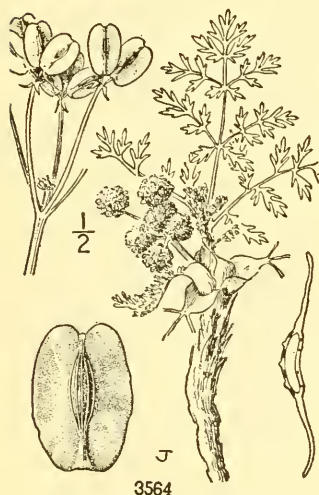
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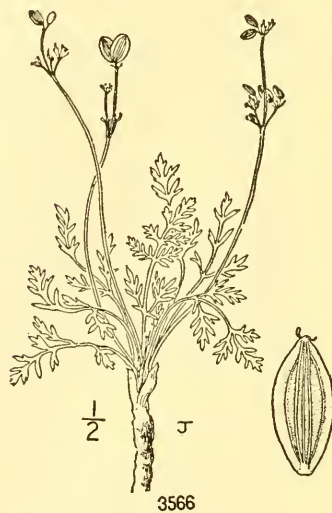
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3558. *Lomatium Rollinsii*
 3559. *Lomatium Cous*
 3560. *Lomatium montanum*

3561. *Lomatium circumdatum*
 3562. *Lomatium vaginatum*
 3563. *Lomatium utriculatum*

3564. *Lomatium Vaseyi*
 3565. *Lomatium ciliolatum*
 3566. *Lomatium Tracyi*

long slender taproot. Leaves 1-3-ternate, or simply ternate, then 1-2-pinnate; leaf-divisions linear to filiform, 0.5-8 cm. long; rays 3-15, ascending to spreading, 1.5-15 cm. long, unequal; bractlets usually filiform, scarious-margined; pedicels 3-15 mm. long, few fertile; flowers yellow or purple; fruit oval to slightly obovate, 9-12 mm. long; wings thin, narrower than to as broad as the body; oil-tubes obscure.

Rocky flats, Arid Transition and Upper Sonoran Zones; North Coast Ranges and western foothills of the northern Sierra Nevada, California. Type locality: "in valle Sacramento, California." May-July.

28. *Lomatium caruifolium* (Hook. & Arn.) Coult. & Rose. Caraway-leaved *Lomatium*. Fig. 3568.

Ferula caruifolia Hook. & Arn. Bot. Beechey 348. 1838.

Lomatium caruifolium Coult. & Rose, Contr. U.S. Nat. Herb. 7: 216. 1900.

Lomatium caruifolium var. *solanense* Jepson, Madroño 1: 151. 1924.

Lomatium caruifolium var. *erythropodum* Jepson, Fl. Calif. 2: 638. 1936.

Plants acaulescent or short-caulescent, 1.5-4.5 dm. tall, glabrous to pubescent, from a long slender taproot. Leaves 1-3-ternate, or simply ternate, then bipinnate; leaf-divisions linear, 2-15 mm. long; petioles wholly sheathing; rays 6-15, unequal, 1-13 cm. long; bractlets obovate, sessile or petiolulate, entire or toothed, green or purplish, scarious-margined, prominently veined; pedicels 2-8 mm. long; flowers yellow; fruit narrowly ovate to obovate, 8-13 mm. long, glabrous; wings thickish, narrower than the body; oil-tubes obscure.

Low, wet ground, Arid Transition and Upper Sonoran Zones; Coast Ranges, Mendocino County to San Luis Obispo County, California. Type locality: California. March-May.

29. *Lomatium humile* (Coult. & Rose) Hoover. Foothill *Lomatium*. Fig. 3569.

Leptotaenia anomala Coult. & Rose, Rev. N. Amer. Umbell. 53. 1888. Not *Lomatium anomalum* M. E. Jones, 1900.

Leptotaenia humilis Coult. & Rose, Contr. U.S. Nat. Herb. 7: 200. 1900.

Leptotaenia humilis var. *denticulata* Jepson, Madroño 1: 146. 1923.

Lomatium humile Hoover ex. Math. & Const. Bull. Torrey Club 69: 246. 1942.

Plants acaulescent, 1.5-5.5 dm. tall, glabrous or scaberulous in the inflorescence, from a long slender taproot. Leaves ternate, then 1-2-pinnate; leaf-divisions linear to filiform, 2-60 mm. long; fertile rays 2-5, spreading to ascending 1.5-7 cm. long; bractlets orbicular to lanceolate, often petiolulate, scarious-margined, toothed to entire, conspicuously veined; pedicels 1-4 mm. long; flowers yellow (or purple?); fruit oval to orbicular, 6-12 mm. long, glabrous or denticulate on the margins; wings thick and corky, narrower than the body; oil-tubes obscure.

Grassy slopes, Arid Transition and Upper Sonoran Zones; western foothills of the Sierra Nevada, from Tehama County to Tulare County, California. Type locality: plains near Chico, Butte County, California. April-July.

30. *Lomatium Bradshawii* (Rose) Math. & Const. Bradshaw's *Lomatium*. Fig. 3570.

Leptotaenia Bradshawii Rose ex Mathias, Leaflets West. Bot. 1: 101. 1934.

Lomatium Bradshawii Math. & Const. Bull. Torrey Club 69: 246. 1942.

Plants acaulescent or short-caulescent, glabrous, 2-6.5 dm. tall, from a long slender taproot. Leaves ternate, then 1-2-pinnate; leaf-division filiform to linear, 3-8 mm. long; fertile rays 2-5, spreading, unequal, 5-13 cm. long; bractlets orbicular, scarious-margined, 1-2-ternate; pedicels 2-5 mm. long, few fertile; flowers light yellow; fruit oblong to oblong-oval, 8-13 mm. long, glabrous; wings thick and corky, narrower than the body; oil-tubes obscure.

Swales, Humid Transition Zone; Willamette Valley, Oregon. Type locality: Eugene, Oregon. May-July.

31. *Lomatium Peckianum* Math. & Const. Peck's *Lomatium*. Fig. 3571.

Lomatium Peckianum Math. & Const. Bull. Torrey Club 69: 155. 1942.

Plants acaulescent, 1-3 dm. tall, scaberulous to glabrous, from a long slender taproot. Leaves ternate, then again 1-2-ternate; leaf-divisions oblong to linear, 1-18 mm. long; rays 1-5, ascending, obsolete to 5 cm. long, very unequal; bractlets none or few, narrow and inconspicuous; pedicels 2-7 mm. long; ovaries granulate-roughened; fruit oblong-oval, 2-15 mm. long, granulate-roughened to glabrate; wings less than half the width of the body; oil-tubes several in the intervals, 6-8 on the commissure.

Dry hillsides, Upper Sonoran Zone; south-central Oregon and Siskiyou County, California. Type locality: Blye, Klamath County, Oregon. May-June.

32. *Lomatium nevadense* (S. Wats.) Coult. & Rose. Nevada *Lomatium*. Fig. 3572.

Peucedanum nevadense S. Wats. Proc. Amer. Acad. 11: 143. 1876.

Peucedanum nevadense var. *cupulatum* M. E. Jones, Contr. West. Bot. No. 8: 29. 1898.

Lomatium nevadense Coult. & Rose, Contr. U.S. Nat. Herb. 7: 220. 1900.

Plants acaulescent or short-caulescent, 1-4.5 dm. tall, pubescent, from a long slender taproot sometimes with a deep-seated tuber. Leaves tripinnate; leaf-divisions crowded, oblong, 2-3 mm. long; rays 8-22, spreading, unequal, 1-2.5 cm. long; bractlets conspicuous, linear and distinct or obovate and connate, scarious-margined; pedicels 3-10 mm. long; flowers white;

fruit ovate to oblong-obovate, 6–8 mm. long, more or less puberulent; wings narrower than the body; oil-tubes 2–9 in the intervals, 4–12 on the commissure.

Dry hills, Upper Sonoran and Arid Transition Zones; Oregon and eastern California, mostly east of the Sierra Nevada, eastward to western Utah and southern Arizona. Type locality: "western Nevada from the Washoe to the West Humboldt Mountains." April–July.

Lomatium nevadense var. *Parishii* (Coul. & Rose) Jepson, Madroño 1: 156. 1924. (*Peucedanum Parishii* Coul. & Rose, Bot. Gaz. 13: 209. 1888.) Mostly taller; leaf-divisions sometimes elongate, up to 35 mm. long; rays usually longer, 1.5–5.5 cm. long; bractlets sometimes reduced to a sheath or a single bract; pedicels 3–12 mm. long; ovaries glabrous; fruit 7–10 mm. long, glabrous; oil-tubes 1–4 in the intervals, 4–7 on the commissure. Southeastern Oregon to northern Sonora east of the Sierra Nevada, San Bernardino Mountains, California, east to Nevada and western New Mexico. Type locality: Bear Valley, San Bernardino Mountains.

Lomatium nevadense var. *pseudorientale* (M. E. Jones) Munz, Man. S. Calif. 360. 1935. (*Cogswellia nevadensis* var. *pseudorientalis* M. E. Jones, Contr. West. Bot. No. 12: 37. 1908.) Similar to variety *Parishii*; petioles more prominently scarious-margined; fruit-wings broader than the body, the dorsal ribs evident. Mountains in the Mojave Desert, California, adjacent Nevada and northwestern Arizona. Type locality: Skull Valley, Arizona.

33. *Lomatium Plummerae* Coul. & Rose. Plummer's *Lomatium*. Fig. 3573.

Peucedanum Plummerae Coul. & Rose, Bot. Gaz. 14: 278. 1889.

Lomatium Plummerae Coul. & Rose, Contr. U.S. Nat. Herb. 7: 232. 1900.

Plants short-caulescent, 2–3.5 dm. tall, glabrous, from a long slender taproot. Leaves ternate, then bipinnate; leaf-divisions linear to oblong, 3–7 mm. long; petioles wholly sheathing; rays 10–25, ascending, unequal, 0.5–7.5 cm. long; bractlets dimidiate, linear-lanceolate, acute, distinct or connate to above the middle, scarious at least on the margin, prominently nerved, entire or toothed; pedicels 3–8 mm. long; flowers yellow or purplish; fruit oblong to oblong-ovate, 9–13 mm. long, usually acute at the apex, glabrous; wings narrower than the body; oil-tubes 1, rarely 2–3, in the intervals, 4–8 on the commissure.

Sandy slopes, Arid Transition Zone; northern Sierra Nevada from Sierra County to Shasta County, California, and adjacent Nevada. Type locality: Sierra Valley, Sierra County, California. May–June.

Lomatium Plummerae var. *Sonnei* (Coul. & Rose) Jepson, Madroño 1: 157. 1924. (*Lomatium Sonnei* Coul. & Rose, Contr. U.S. Nat. Herb. 7: 236. 1900.) Pubescent; the pedicels up to 10 mm. long; fruit glabrous. Eastern Sierra County, California, and adjacent Nevada. Type locality: Verdi, Washoe County, Nevada.

Lomatium Plummerae var. *Austiniæ* (Coul. & Rose) Mathias, Ann. Mo. Bot. Gard. 25: 257. 1937. (*Peucedanum Austiniæ* Coul. & Rose, Bot. Gaz. 13: 208. 1888.) Pubescent; fruit ovate, about 8 mm. long, not pointed at the apex. Plumas County, California, the type locality.

34. *Lomatium MacDougalii* Coul. & Rose. MacDougal's *Lomatium*. Fig. 3574.

Lomatium MacDougalii Coul. & Rose, Contr. U.S. Nat. Herb. 7: 233. 1900.

Lomatium Jonesii Coul. & Rose, loc. cit.

Lomatium semisepultum Peck, Proc. Biol. Soc. Wash. 50: 122. 1937.

Plants acaulescent, 0.7–3 dm. tall, villous throughout, from a long slender taproot. Leaves ternate, then tripinnate; leaf-divisions crowded, linear to ovate, 1–5 mm. long; petioles usually wholly sheathing; rays 2–14, spreading, 0.5–6 cm. long; bractlets scarious, linear, usually distinct, villous; pedicels 3–10 mm. long; flowers yellow, somewhat purplish-tinged; fruit ovate to suborbicular, 6–11 mm. long, pubescent; wings narrower than the body; oil-tubes 1–4 in the intervals, 4–6 on the commissure.

In sagebrush, Upper Sonoran Zone; central Oregon and eastern California, to western Wyoming and central Arizona. Type locality: Mormon Lake, Arizona. June–July.

35. *Lomatium dasycarpum* (Torr. & Gray) Coul. & Rose. Woolly-fruited *Lomatium*. Fig. 3575.

Peucedanum dasycarpum Torr. & Gray, Fl. N. Amer. 1: 628. 1840.

Peucedanum Pringlei Coul. & Rose, Bot. Gaz. 13: 209. 1888.

Peucedanum Jaredii Eastw. Zoe 5: 88. 1900.

Lomatium dasycarpum Coul. & Rose, Contr. U.S. Nat. Herb. 7: 218. 1900.

Lomatium dasycarpum var. *decorum* Jepson, Madroño 1: 154. 1924.

Lomatium dasycarpum var. *medium* Jepson, loc. cit.

Plants acaulescent or short-caulescent, 1–4 dm. tall, villous-tomentose to glabrate, purplish, especially below, from a long slender taproot. Leaves quadripinnate, occasionally ternate, then pinnately decompound; leaf-divisions crowded, linear, 1–3 mm. long; rays 10–20, spreading, 1–8.5 cm. long; bractlets linear-lanceolate, acute, sometimes connate; pedicels 7–20 mm. long, usually longer than the fruit; flowers greenish, appearing white because of the pubescent petals, or purplish; fruit orbicular to ovate-oblong, 8–15 mm. long; body tomentulose to glabrate; wings broader than the body, sparingly villous to glabrate; oil-tubes 1–4 in the intervals, 2–4 on the commissure.

Usually in sandy or stony ground, Arid Transition and Upper Sonoran Zones; Coast Ranges, California, from Humboldt and Trinity Counties to Lower California. Type locality: California. March–June.

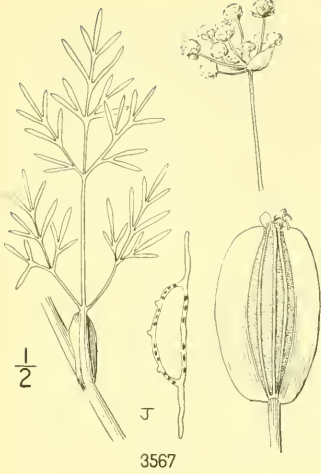
36. *Lomatium mohavense* Coul. & Rose. Mojave *Lomatium*. Fig. 3576.

Peucedanum mohavense Coul. & Rose, Rev. N. Amer. Umbell. 62. 1888.

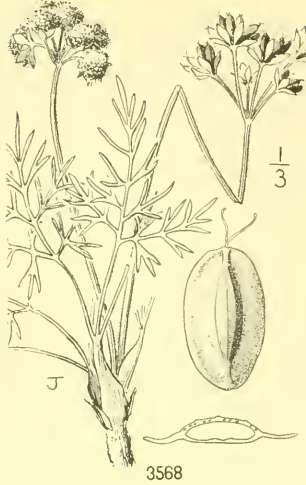
Peucedanum argense M. E. Jones, Contr. West. Bot. No. 8: 30. 1898.

Lomatium mohavense Coul. & Rose, Contr. U.S. Nat. Herb. 7: 234. 1900.

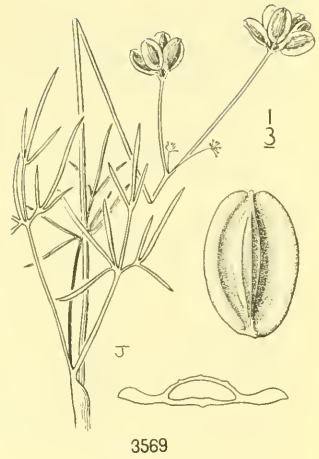
Plants acaulescent, 1–3 dm. tall, short hoary-pubescent, from a long slender taproot. Leaves



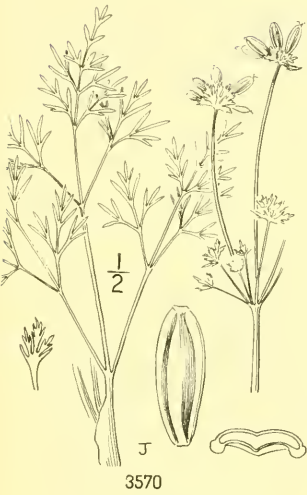
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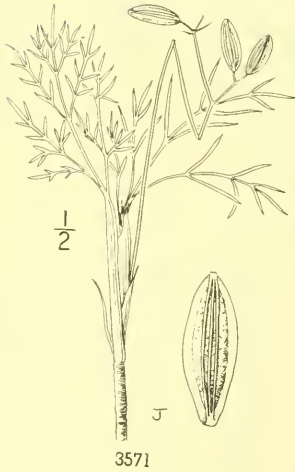
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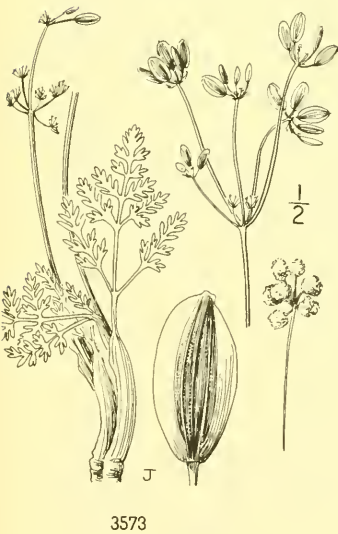
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3567. *Lomatium marginatum*
3568. *Lomatium caruifolium*
3569. *Lomatium humile*

3570. *Lomatium Bradshawii*
3571. *Lomatium Peckianum*
3572. *Lomatium nevadense*

3573. *Lomatium Plummerae*
3574. *Lomatium Macdougalii*
3575. *Lomatium dasycarpum*

3-4-pinnate; leaf-divisions crowded, linear, 2-5 mm. long; rays 10-16, subequal, 1-4.5 cm. long; bractlets linear, acute, sometimes inconspicuously scarious-margined; pedicels 1-10 mm. long; flowers purple, rarely yellow; fruit ovate to orbicular, 4.5-9 mm. long, pubescent; wings narrower than or equaling the body; oil-tubes 1-4 in the intervals, 4-6 on the commissure.

Dry gravelly slopes, Upper and Lower Sonoran Zones; deserts, southern California and adjacent Nevada, especially in the Mojave Desert. Type locality: "Yucca, Mojave Desert, California." April-May.

37. *Lomatium tomentosum* (Benth.) Coult. & Rose. Woolly Lomatium. Fig. 3577.

Peucedanum tomentosum Benth. Pl. Hartw. 312. 1849.

Lomatium tomentosum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 219. 1900.

Plants short-caulescent, villous-tomentose throughout, 2.5-5 dm. tall, from a long slender taproot. Leaves pinnately decompose or ternate, then quadripinnate; leaf-divisions crowded, filiform, 2-6 mm. long; rays 12-21, spreading, subequal, 2.5-8.5 cm. long; bractlets lanceolate to ovate-lanceolate, distinct or connate below, acute to acuminate, entire or cleft above; pedicels 5-20 mm. long, shorter than the mature fruit; flowers greenish white or purplish; fruit ovate-oblong, 16-22 mm. long, tomentulose; wings about equaling the body, tomentulose; oil-tubes 1-3 in the intervals, 3 on the commissure.

Rocky soil, Upper Sonoran Zone; Great Valley, Sierra Nevada foothills, and Tehachapi Mountains, California. Type locality: Sacramento Valley, probably in Butte County, California. March-June.

38. *Lomatium macrocarpum* (Hook. & Arn.) Coult. & Rose. Large-fruited Lomatium. Fig. 3578.

Ferula macrocarpa Hook. & Arn. Bot. Beechey 348. 1838.

Peucedanum macrocarpum var. *f. eurycarpum* A. Gray, Proc. Amer. Acad. 8: 385. 1872.

Lomatium macrocarpum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 217. 1900.

Lomatium macrocarpum var. *semivittatum* Piper, Bull. Torrey Club 29: 224. 1902.

Lomatium macrocarpum var. *artemisiarum* Piper, op. cit. 223.

Lomatium flavum Suksd. Allg. Bot. Zeit. 12: 6. 1906.

Cogsuella simulans Coult. & Rose, Contr. U.S. Nat. Herb. 12: 451. 1909.

Lomatium macrocarpum var. *Douglasii* Jepson, Madroño 1: 153. 1924.

Plants short-caulescent, 1-5 dm. tall, densely tomentose to villous or glabrate, purplish especially below, from a slender or somewhat swollen taproot. Leaves ternate, then 2-3-pinnate; leaf-divisions confluent, oblong to linear, 1-7 mm. long; rays 5-25, spreading, 1-8.5 cm. long; bractlets dimidiate, linear-lanceolate, acute, becoming reflexed in the mature plant; pedicels 1-14 mm. long, spreading; flowers white, yellow or purplish; fruit narrowly oblong, 9-20 mm. long, 2-8 mm. broad; ovaries and young fruit glabrous to villous, the mature fruit glabrous or glabrate; wings narrower than the body; oil-tubes 1-3 in the intervals, 2-6 on the commissure.

Dry hills and plains, Upper Sonoran and Arid Transition Zones; British Columbia south to Kern and Monterey Counties, California, east to Manitoba and North Dakota. Type locality: California. April-June.

Lomatium macrocarpum var. *ellipticum* (Torr. & Gray) Jepson, Madroño 1: 153. 1924. (*Peucedanum nudicale* var. *ellipticum* Torr. & Gray, Pacif. R. Rep. 2: 121. 1885.) Pedicels often longer, up to 16 mm. long; fruit oblong-oval, 16-18 mm. long, 6-10 mm. broad, glabrous; wings twice as broad as the body. Northern Sierra Nevada foothills, California. Type locality: near the sources of the Sacramento in the Sierra Nevada.

39. *Lomatium Congdonii* Coult. & Rose. Congdon's Lomatium. Fig. 3579.

Lomatium Congdonii Coult. & Rose, Contr. U.S. Nat. Herb. 7: 232. 1900.

Plants acaulescent or short-caulescent, 1.8-3.6 dm. tall, from a cluster of old leaf-sheaths, from a long taproot. Leaves ternate to quinate, then 2-3-pinnate, the rachises scaberulous; leaf-divisions distinct, linear, 3-10 mm. long; petiole wholly sheathing, white-scarious; rays 6-16, ascending, 3-13.5 cm. long; bractlets absent; pedicels 6-15 mm. long; flowers yellow; fruit oblong to subobovate, 7-10 mm. long; wings about half the width of the body; oil-tubes obscure, usually solitary in the intervals, 2-4 on the commissure.

Rocky soils, Upper Sonoran Zone; foothills of the central Sierra Nevada, California. Type locality: West Water Ditch, Mariposa County, California. May.

40. *Lomatium Torreyi* Coult. & Rose. Torrey's Lomatium. Fig. 3580.

Peucedanum Torreyi Coult. & Rose, Bot. Gaz. 14: 276. 1889.

Lomatium Torreyi Coult. & Rose, Contr. U.S. Nat. Herb. 7: 229. 1900.

Plants acaulescent or caulescent, 1-2.5 dm. tall, glabrous to sparingly scaberulous, from a cluster of dried leaf-sheaths. Leaves ternate, then tripinnate; leaf-divisions filiform, 3-8 mm. long; petioles wholly sheathing, with a white scarious margin; rays 5-9, unequal, erect, 1-4 cm. long; bractlets absent; pedicels 1-4 mm. long; flowers yellow; fruit narrowly oblong, 10-16 mm. long, narrowed toward the base; wings less than half the width of the body; oil-tubes solitary in the intervals.

Clefts of granite rocks, Boreal Zones; southern Sierra Nevada, California. Type locality: "Yosemite Valley," California. May-Aug.

41. *Lomatium Engelmannii* Mathias. Engelmann's Lomatium. Fig. 3581.

Lomatium Engelmannii Mathias, Ann. Mo. Bot. Gard. 25: 268. 1937.

Plants acaulescent, 1-3 dm. tall, pubescent to glabrate, from a long slender taproot. Leaves ternate or pinnate; leaf-divisions confluent, ovate-oblong to linear-lanceolate, 1-15 mm. long; petioles wholly sheathing, purplish; fertile rays 1-4, unequal, 1-10 cm. long; bractlets usually absent; pedicels 2-12 mm. long; flowers yellow; fruit ovate-oblong, 9-14 mm. long, glabrous; wings half the width of the body; oil-tubes 1-2 in the intervals, 2-6 on the commissure.

Gravelly slopes, Canadian Zone; high mountains of southwestern Oregon and northwestern California. Type locality: Scott's Mountain, Siskiyou County, California. June-Aug.

42. *Lomatium angustatum* (Coul. & Rose) St. John. Cascade Lomatium. Fig. 3582.

Peucedanum Martindalei var. *angustatum* Coul. & Rose, Bot. Gaz. 13: 143. 1888.

Lomatium Hallii of authors, not *Peucedanum Hallii* S. Wats. 1876.

Lomatium angustatum St. John in St. John & Hardin, Mazama 11: 83. 1929.

Plants short-caulescent, 1.5-2 dm. tall, glabrous, from a long slender taproot. Leaves ternate, then 2-3-pinnate; leaf-divisions confluent and overlapping, ovate, 1-2 mm. long, somewhat obtuse; rays 6-16, unequal, 0.5-7 cm. long; bractlets absent; pedicels 1-6 mm. long; flowers creamy white; fruit narrowly oblong, 6-10 mm. long; wings very narrow; oil-tubes usually solitary in the intervals, 2-4 on the commissure.

Rocky slopes, Boreal Zones; mountains of western British Columbia to the Cascade Mountains, Oregon. Type locality: Cascade Mountains, Oregon.

Lomatium angustatum var. *flavum* G. N. Jones, Univ. Wash. Pub. Biol. 5: 202. 1936. Leaves sometimes fleshier; flowers lemon-yellow; pedicels 8-16 mm. long. Olympic Mountains, Washington, the type locality.

43. *Lomatium dissectum* (Nutt.) Math. & Const. Fern-leaved Lomatium. Fig. 3583.

Leptotaenia dissecta Nutt. ex. Torr. & Gray, Fl. N. Amer. 1: 630. 1840.

Leptotaenia dissecta var. *foliosa* Hook. Lond. Journ. Bot. 6: 236. 1847.

Cynapium ? *Bigelovii* Torr. Pacif. R. Rep. 4: 94. 1857.

Ferula dissoluta S. Wats. Bot. Calif. 1: 271. 1876.

Lomatium dissectum Math. & Const. Bull. Torrey Club 69: 246. 1942.

Plants caulescent, rarely acaulescent, 8-14 dm. tall, foliage puberulent or rarely glabrous, from a stout thickened root bearing a stout caudex. Leaves ternate, then 2-4-pinnate; leaf-divisions linear-oblong, 2-8 mm. long, puberulent; stem-petioles dilated; rays numerous, 3-13 cm. long, subequal; bractlets few, linear, entire; pedicels 1-3 mm. long; flowers purple or yellow; fruit oblong-oval, 12-16 mm. long; wings very thick and corky, much narrower than the body; oil-tubes obscure.

Rocky soil, Transition and Boreal Zones; western Washington to northern California, east to Idaho. Type locality: "Plains of the Oregon near the confluence of the Wahlamet." June-Aug.

Lomatium dissectum var. *multifidum* (Nutt.) Math. & Const. Bull. Torrey Club 69: 246. 1942. (*Leptotaenia multifida* Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 630. 1840; *Leptotaenia Eatonii* Coul. & Rose, Rev. N. Amer. Umbell. 52. 1888.) Leaf-divisions 2-22 mm. long; pedicels 4-20 mm. long, exceeding the sterile flowers. British Columbia to southern California, east to Alberta, Colorado and Arizona. More common and widely distributed than the typical form. Type locality: "plains of the Oregon [Columbia], east of Wallawallah, and in the Blue Mountains."

44. *Lomatium columbianum* Math. & Const. Columbia Lomatium. Fig. 3584.

Ferula purpurea S. Wats. Proc. Amer. Acad. 21: 453. 1886. Not *Lomatium purpureum* A. Nels. 1901.

Lomatium columbianum Math. & Const. Bull. Torrey Club 69: 246. 1942.

Plants acaulescent, glabrous, 3-5 dm. high, from a stout, thickened root bearing a caudex clothed with purplish, dilated, bladeless sheaths. Leaves ternate, then 2-4-pinnate; leaf-divisions linear to filiform, 3-20 mm. long; rays 6-10, 3-20 cm. long, unequal; bractlets linear to lanceolate; pedicels 15-25 mm. long; flowers purple; fruit oblong to oval, 16-24 mm. long; wings thick and corky, much narrower than the body; oil-tubes 2-3 in the intervals, 4 on the commissure.

Basaltic bluffs, Arid Transition Zone; Columbia River Gorge and vicinity, Oregon and Washington. Type locality: lower Columbia River, Klickitat County, Washington. April-July.

45. *Lomatium Grayi* Coul. & Rose. Gray's Lomatium. Fig. 3585.

Peucedanum millefolium S. Wats. Bot. King Expl. 129. 1871. Not Sonder, 1861-62.

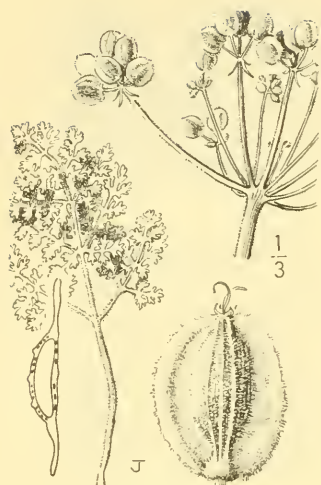
Peucedanum Grayi Coul. & Rose, Bot. Gaz. 13: 209. 1888.

Lomatium Grayi Coul. & Rose, Contr. U.S. Nat. Herb. 7: 229. 1900.

Peucedanum Grayi var. *aberrans* M. E. Jones, Contr. West. Bot. No. 10: 55. 1902.

Leptotaenia filicina M. E. Jones, op. cit. 56.

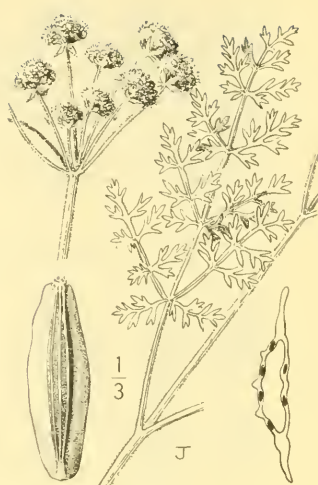
Plants acaulescent or short-caulescent, 2-6.1 dm. tall, from a long thickened taproot. Leaves 1-2-ternate or quinate, then 2-3-pinnate, glabrous to scaberulous; leaf-divisions crowded, linear to filiform, 1-11 mm. long; rays 7-22, spreading, 2-15 cm. long; bractlets filiform, entire, occasionally toothed, rarely deciduous; pedicels 6-22 mm. long; flowers yellow; fruit ovate-oblong



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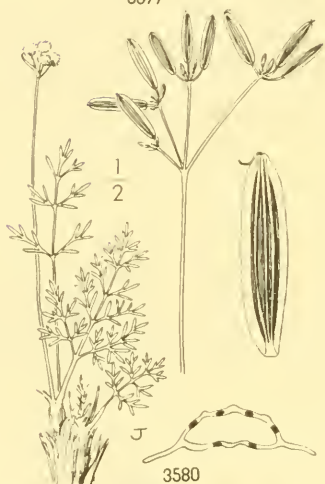
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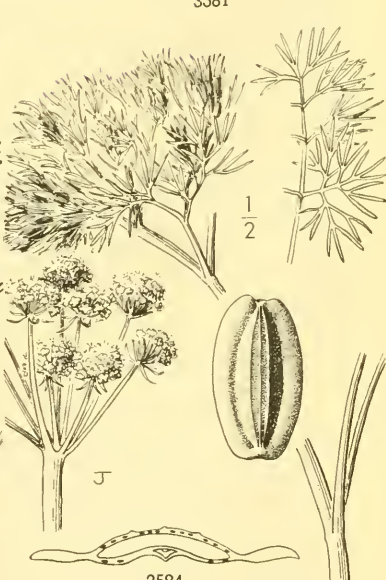
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3576. *Lomatium mohavense*3577. *Lomatium tomentosum*3578. *Lomatium macrocarpum*3579. *Lomatium Congdonii*3580. *Lomatium Torreyi*3581. *Lomatium Engelmannii*3582. *Lomatium angustatum*3583. *Lomatium dissectum*3584. *Lomatium columbianum*

to oblong, 7-16 mm. long, glabrous; wings thin, narrower than to equaling the body; oil-tubes solitary, rarely 2-3, in the intervals, 2-6 on the commissure.

Dry rocky slopes, Upper Sonoran and Arid Transition Zones; eastern Washington and Oregon to western Wyoming and Colorado. Type locality: Antelope Island, Salt Lake, Utah. April-May.

46. *Lomatium salmoniflorum* (Coul. & Rose.) Math. & Const.
 Salmon-flowered Lomatium. Fig. 3586.

Leptotaenia salmoniflora Coul. & Rose, Contr. U.S. Nat. Herb. 7: 201. 1900.

Lomatium salmoniflorum Math. & Const. Bull. Torrey Club 69: 246. 1942.

Plants caulescent, glabrous, 2-5 dm. tall, from a stout thickened root. Leaves ternate, then 2-4-pinnate; leaf-divisions filiform to linear, 1-7 mm. long; rays 4-13, spreading, 1-6 cm. long; bractlets absent or few, filiform; pedicels 2-14 mm. long; flowers salmon-yellow; fruit oblong-oval, 10-14 mm. long, glabrous; wings much narrower than and the same color as the body, slightly corky-thickened; oil-tubes solitary in the intervals, 2 on the commissure.

Basaltic slopes, Upper Sonoran Zone; Snake River drainage, Washington and Oregon to Idaho. Type locality: "near upper ferry, Clearwater River above Lewiston, Nez Perce County, Idaho." May-July.

47. *Lomatium minus* (Rose) Math. & Const. John Day Valley Lomatium.
 Fig. 3587.

Leptotaenia minor Rose ex Howell, Fl. N.W. Amer. 1: 251. 1898.

Lomatium minus Math. & Const. Bull. Torrey Club 69: 246. 1942.

Plants short-caulescent, 1.5-3 dm. high, glabrous, from stout thickened roots bearing a caudex clothed with a few scarious, dilated, bladeless sheaths. Leaves ternate, then 2-4-pinnate; leaf-divisions linear to filiform, 1-3 mm. long; peduncles stout and inflated; rays 6-9, stout, spreading, subequal, 2-6 cm. long; bractlets linear, scarious; flowers light purple; fruit oblong-oval, 12-16 mm. long, glabrous; wings narrower than and the same color as the body, slightly corky-thickened; oil-tubes large, solitary in the intervals, 3-4 on the commissure.

Rocky soil, Arid Transition Zone; central to southeastern Oregon. Type locality: Rock Creek, Morrow County, Oregon. May-June.

48. *Lomatium cuspidatum* Math. & Const. Wenatchee Lomatium. Fig. 3588.

Leptotaenia Watsonii Coul. & Rose, Rev. N. Amer. Umbell. 52. 1888. Not *Peucedanum Watsonii* Coul. & Rose. 1888.

Lomatium cuspidatum Math. & Const. Bull. Torrey Club. 69: 246. 1942.

Plants acaulescent or short-caulescent, glabrous, 2-6 dm. tall, from a stout, thickened root bearing a caudex clothed with dilated, bladeless sheaths. Leaves ternate, then 2-3-pinnate; leaf-divisions ovate to lanceolate, rigid, cuspidate, 1-5 mm. long; rays 5-12, 3-10 cm. long, unequal; bractlets linear-lanceolate to filiform, scarious; pedicels 8-28 mm. long; flowers purple, anthers purple; fruit narrowly oblong-oval, 9-13 mm. long; wings much narrower than and colored like the body, slightly corky-thickened; oil-tubes usually 3 in the intervals, several on the commissure.

Basaltic slopes, Arid Transition Zone; Wenatchee region of central Washington. Type locality: Wenatchee Region, Kittitas County, Washington. May-July.

Lomatium tuberosum Hoover, Leaflets West. Bot. 4: 39. 1944. Reported to differ from *L. cuspidatum* in its tuberous base, its linear and herbaceous leaf-divisions, and yellow anthers. Known only from Yakima County, Washington.

49. *Lomatium serpentinum* (M. E. Jones) Mathias. Snake Canyon Lomatium.
 Fig. 3589.

Cogswellia serpentina M. E. Jones, Contr. West. Bot. No. 12: 42. 1908.

Cogswellia fragrans St. John, Fl. S. E. Wash. 290. 1937.

Lomatium serpentinum Mathias, Ann. Mo. Bot. Gard. 25: 271. 1937.

Plants acaulescent, 2.5-3 dm. tall, essentially glabrous, root thick and woody with a multicapital caudex. Leaves 1-2-ternate, then bipinnate; leaf-divisions crowded, lanceolate to oblanceolate, 2-5 mm. long, minutely papillose above; rays 10-17, spreading to ascending, unequal, 1.5-7 cm. long; bractlets linear-lanceolate, finely puberulent; pedicels 3-15 mm. long; flowers bright yellow; fruit oblong, 6-10 mm. long, glabrous; wings half as broad as to equaling the width of the body; oil-tubes solitary in the intervals, 2 on the commissure.

Basaltic slopes, Upper Sonoran Zone; Snake River Canyon, Washington, Oregon and Idaho. Type locality: rocky banks of the Snake River near the mouth of McDougal Creek, Oregon. April-June.

50. *Lomatium Donnellii* Coul. & Rose. Donnell's Lomatium. Fig. 3590.

Peucedanum Donnellii Coul. & Rose, Bot. Gaz. 13: 143. 1888.

Lomatium Donnellii Coul. & Rose, Contr. U.S. Nat. Herb. 7: 231. 1900.

Plants acaulescent or caulescent with the development of a pseudoscape, 1.3-3.3 dm. tall, glabrous, from a long, somewhat stout taproot. Leaves ternate, then 2-3-pinnate; leaf-divisions confluent, linear, 1-7 mm. long, acute; rays 8-30, spreading to suberect, unequal, 1-9 cm. long; bractlets filiform to linear-lanceolate; pedicels 3-15 mm. long; flowers yellow; fruit ovate to

ovate-oblong, 5-9 mm. long; wings less than half the width of the body; oil-tubes 3-6 in the intervals, 4-6 on the commissure.

Hillides, Arid Transition and Upper Sonoran Zones; central Washington and Oregon, to northern Idaho and Utah. Type locality: John Day Valley, Oregon. May-June.

Lomatium Nelsonianum J. F. Macbride, Contr. Gray Herb. No. 53: 15. 1918. Plants short-caulescent, about 4 dm. tall; leaves ovate, ternately to ternate-pinnately decomposed; leaf-divisions narrowly linear, about 3 mm. long, glabrous or sparingly hispid; petioles 2.5-5 cm. long; rays 12-15, unequal, 2.5-7 cm. long; bractlets filiform, sparingly hispid; fruiting pedicels 10-16 mm. long, spreading; fruit oblong, 7-9 mm. long, wings slightly narrower than the body; oil-tubes 3 in the intervals, 6 on the commissure. Known only from the original collection (which is apparently a mixture of this and of *L. dissectum*), "dry rocky hillsides near Mule Creek, Curry County, Oregon," and one later collection from the same area.

51. *Lomatium oreganum* Coult. & Rose. Blue Mountain *Lomatium*. Fig. 3591.

Peucedanum oreganum Coult. & Rose, Rev. N. Amer. Umbell. 64. 1888.

Lomatium oreganum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 224. 1900.

Plants very low, acaulescent, 2.5-6 cm. tall, villosulose throughout, from a multicapital woody caudex. Leaves bipinnate; leaf-divisions crowded, oblong, 2-3 mm. long; umbels greatly reduced, with one fertile umbellet, the fertile rays 1-5 mm. long, and 2-3 sessile sterile umbellets; bractlets linear, acute; pedicels 1-1.5 mm. long; flowers yellow; fruit oblong, about 5 mm. long, villosulose; wings much narrower than the body; oil-tubes 2-3 in the intervals, 4 on the commissure.

Rocky ridges, Boreal Zones; Blue and Wallowa Mountains, Oregon. Type locality: alpine rocks, Blue and Eagle Creek Mountains, Oregon. June-Aug.

52. *Lomatium Greenmanii* Mathias. Greenman's *Lomatium*. Fig. 3592.

Lomatium Greenmanii Mathias, Ann. Mo. Bot. Gard. 25: 274. 1937.

Plants low, caulescent, 5-8 cm. tall, from a multicapital woody caudex. Leaves 1-2-pinnate, the single stem-leaf much reduced, pinnate; leaf-divisions oblong, distinct, 5-10 mm. long, the margins slightly roughened; umbels reduced to 1-3 fertile umbellets and 1-2 sessile sterile umbellets, the fertile rays 1.5-2 mm. long; bractlets filiform, white-scarious; pedicels about 1 mm. long; flowers white; fruit ovate, 3.5 mm. long, glabrous; wings much narrower than the body; oil-tubes solitary in the intervals, 2 on the commissure.

Rocky ridges, Boreal Zones; high summits of the Wallowa Mountains, Oregon. Type locality: Wallowa Mountains, head of Keystone Creek. July-Aug.

53. *Lomatium Parryi* (S. Wats.) J. F. Macbride. Parry's *Lomatium*. Fig. 3593.

Peucedanum Parryi S. Wats. Proc. Amer. Acad. 11: 143. 1876.

Peucedanum scopulorum M. E. Jones, Contr. West. Bot. No. 8: 31. 1898.

Lomatium Parryi J. F. Macbride, Contr. Gray Herb. No. 56: 35. 1918.

Cogswellia Cottamii M. E. Jones, Contr. West. Bot. No. 16: 36. 1930.

Plants acaulescent, glabrous, 2-4 dm. tall, from a long, somewhat stout taproot. Leaves narrowly oblong, 2-3-pinnate; leaf-divisions linear, 2-9 mm. long; rays about 15, suberect, subequal, 2-4.5 cm. long; bractlets linear, acute, subscarious, sometimes cleft; pedicels 10-17 mm. long; flowers yellow; fruit oblong, 9-12 mm. long; wings equaling or somewhat broader than the body; oil-tubes 2-3 in the intervals, 4 on the commissure.

Desert mountain ranges, Upper Sonoran and Arid Transition Zones; Panamint Mountains, California, to southeastern Utah. Type locality: southern Utah, probably in the vicinity of St. George.

54. *Lomatium Hallii* (S. Wats.) Coult. & Rose. Hall's *Lomatium*. Fig. 3594.

Peucedanum Hallii S. Wats. Proc. Amer. Acad. 11: 141. 1876.

Peucedanum microcarpum Howell ex. Coult. & Rose, Rev. N. Amer. Umbell. 65. 1888.

Lomatium Hallii Coult. & Rose, Contr. U.S. Nat. Herb. 7: 224. 1900.

Lomatium Leibergii Coult. & Rose, loc. cit.

Plants short-caulescent, 2-3.5 dm. tall, glabrous except for an occasional slight scaberrulence in the inflorescence. Leaves tripinnate; leaf-divisions distinct except the uppermost, linear or oblong, 2-4 mm. long; rays 9-17, spreading, unequal, 1.3-5 cm. long, glabrous or scaberrulous below; bractlets linear-lanceolate, acuminate; pedicels 4-7 mm. long, glabrous or scaberrulous; flowers yellow; fruit oblong, 5-7 mm. long, glabrous; wings about half the width of the body; oil-tubes 2-3 in the intervals, 5 on the commissure.

Bluffs and river valleys, Humid Transition Zone; western slopes of the Cascade Mountains, Oregon. Type locality: "Oregon," probably Silver Creek, Marion County. April-July.

55. *Lomatium Martindalei* Coult. & Rose. Martindale's *Lomatium*. Fig. 3595.

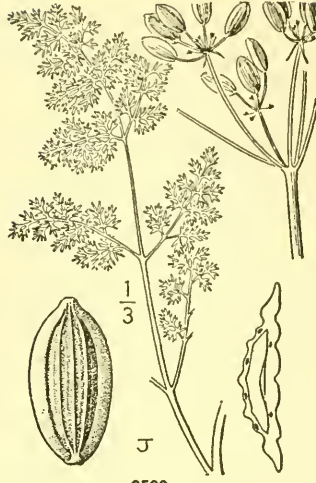
Peucedanum Martindalei Coult. & Rose, Bot. Gaz. 13: 142. 1888.

Lomatium Martindalei Coult. & Rose, Contr. U.S. Nat. Herb. 7: 225. 1900.

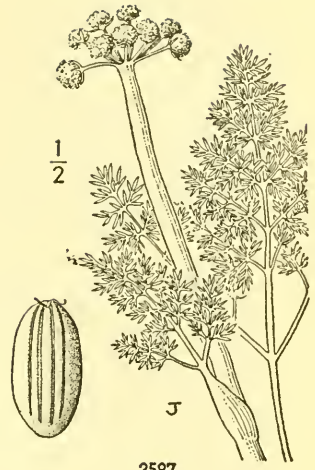
Plants short-caulescent, 1.5-2.5 dm. tall, from a long, somewhat thickened taproot. Leaves 1-2-pinnate; leaf-divisions oblong to cuneate, 5-10 mm. long, pinnately lobed to serrate above, minutely roughened to glabrous on the margins and veins below; rays 4-7, suberect, unequal, 1-5.5 cm. long; bractlets filiform; pedicels 7-10 mm. long, only 2-3 fertile; fruit oblong, 13-16



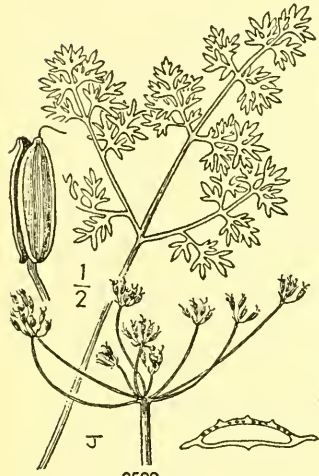
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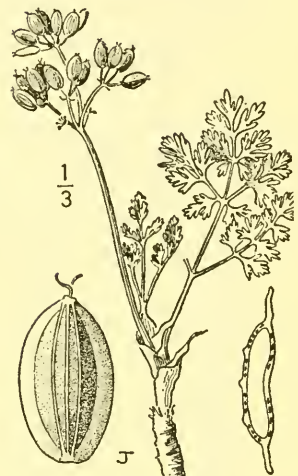
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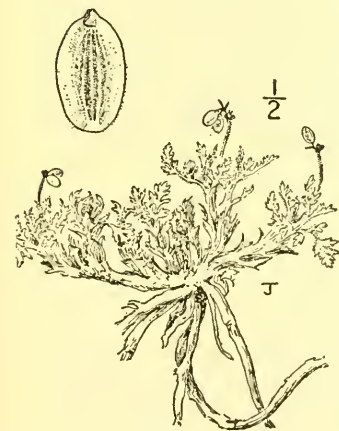
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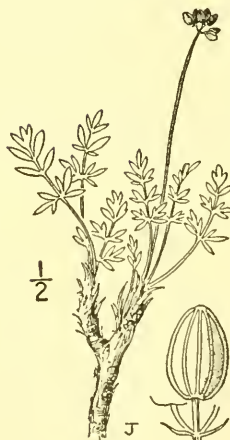
3589



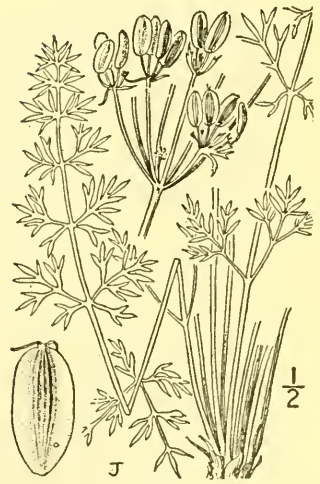
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3585. *Lomatium Grayi*
3586. *Lomatium salmoniflorum*
3587. *Lomatium minus*

3588. *Lomatium cuspidatum*
3589. *Lomatium serpentinum*
3590. *Lomatium Donnellii*

3591. *Lomatium oreganum*
3592. *Lomatium Greenmanii*
3593. *Lomatium Parryi*

mm. long; wings about equaling the body; oil-tubes solitary in the intervals, 2 on the commissure.

Gravelly slopes, Boreal Zones; Cascade Mountains and Coast Ranges of southern Oregon. Type locality: "rocky places, Cascade Mountains, Oregon." May-Aug.

56. *Lomatium simplex* (Nutt.) J. F. Macbride. Great Basin *Lomatium*.
Fig. 3596.

Peucedanum triternatum var. ? *platycarpum* Torr. Stansbury Exp. 389. 1852.

Peucedanum simplex Nutt. in S. Wats. Bot. King Expl. 129. 1871.

Lomatium simplex J. F. Macbride, Contr. Gray Herb. No. 56: 34. 1918.

Plants caulescent or acaulescent, 2-6 dm. tall, clustered from a long slender taproot. Stems mostly simple, few-leaved, densely puberulent; leaves biternate; leaf-divisions linear, 2.5-11.5 cm. long, acute, glabrous above, glabrous to densely puberulent below; rays 8-17, spreading to ascending, unequal, 1.5-5.8 cm. long; bractlets linear or filiform, acute to acuminate, glabrous or puberulent; pedicels 1-9 mm. long; flowers yellow; fruit broadly oblong to suborbicular, 7-14 mm. long, glabrous; wings broader than the body; oil-tubes solitary in the intervals, 2 on the commissure.

Rocky hillsides or flats, Arid Transition and Boreal Zones; central Washington and Oregon to western Montana, southwestern Colorado and Utah. Type locality: "Rocky Mts." Collected by Nuttall. May-July.

Lomatium simplex var. *leptophyllum* (Hook.) Mathias, Ann. Mo. Bot. Gard. 25: 283. 1937. (*Peucedanum triternatum* var. *leptophyllum* Hook. Lond. Journ. Bot. 6: 235. Ovaries and young fruit puberulent. British Columbia, eastern Washington and Oregon, to Alberta, Montana and Wyoming. Type locality: "on the slopes of the high plains of Kootenai River," Idaho.)

57. *Lomatium triternatum* (Pursh) Coult. & Rose. Lewis' *Lomatium*.
Fig. 3597.

Seseli triternatum Pursh, Fl. Amer. Sept. 197. 1814.

Peucedanum Nuttallii Walp. Rep. 2: 411. 1843. Not *Seseli Nuttallii* A. Gray, 1870.

Lomatium triternatum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 227. 1900.

Plants caulescent or acaulescent, 1.7-8 dm. tall, puberulent to glabrate, from a long slender taproot. Leaves ternate or quinate, then pinnate to bipinnate; leaf-divisions few, linear, 1.5-12.6 cm. long, entire; rays 10-20, spreading to suberect, unequal, 1.2-5.5 cm. long; bractlets filiform; pedicels 3-5 mm. long; flowers yellow; ovaries glabrous; fruit oblong, 9-13 mm. long, glabrous; wings narrower than the body; oil-tubes solitary in the intervals, 2 on the commissure.

Stony ground, Transition and Upper Sonoran Zones; western Washington to northern California, east to Alberta and Wyoming. Type locality: "on the waters of the Columbia River," probably on the Clearwater River, Idaho. April-Aug.

Lomatium triternatum var. *anomalum* (M. E. Jones) Mathias, Ann. Mo. Bot. Gard. 25: 285. 1937. (*Lomatium anomalum* M. E. Jones ex. Coult. & Rose, Contr. U.S. Nat. Herb. 7: 237. 1900.) Plants caulescent; leaf-divisions ovate-lanceolate to narrowly obovate, 15-65 mm. long, entire or the uppermost rarely 3-toothed to deeply lobed; rays 10-22, puberulent to glabrate, 1.5-8 cm. long; pedicels 2-8 mm. long; fruit 13-22 mm. long, glabrous (ovaries and young fruit glabrous). Western Idaho to Oregon and northwestern California. Type locality: Indian Valley, Washington County, Idaho. Here may belong *Lomatium giganteum* Coult. & Rose (Contr. U.S. Nat. Herb. 7: 240. 1900.) and *Lomatium nudicaule* var. *puberulum* Jepson (Madroño 1: 159. 1924.).

Lomatium triternatum var. *macrocarpum* (Coult. & Rose) Mathias, op. cit. 286. (*Peucedanum triternatum* var. *macrocarpum* Coult. & Rose, Rev. N. Amer. Umbell. 70. 1888; *Lomatium robustius* Coult. & Rose, Contr. U.S. Nat. Herb. 7: 228. 1900; *Peucedanum triternatum* var. *alatum* Coult. & Rose, loc. cit.) Leaves ternate or quinate, then biternate to bipinnate; leaf-divisions linear to ovate-lanceolate, 1.5-14.5 cm. long, entire; rays 5-18, unequal, 0.6-10.5 cm. long; pedicels 2.5-9 mm. long; ovaries puberulent; fruit oblong, 8-20 mm. long, glabrous or rarely sparsely puberulent. British Columbia south to northern California, eastward to Alberta and northwestern Nevada. Type locality: Klickitat County, Washington.

Lomatium triternatum var. *brevifolium* (Coult. & Rose) Mathias, loc. cit. (*Peucedanum triternatum* var. *brevifolium* Coult. & Rose, Rev. N. Amer. Umbell. 70. 1888.) Plants caulescent, 1.5-3.5 dm. tall, densely soft-puberulent; leaves quinate to bipinnate, leaf-divisions remote, linear, pinnate, 3-22 mm. long; rays 9-11; pedicels 1-4 mm. long; fruit linear-oblong, 6-8 mm. long, densely puberulent. Columbia River Valley, Washington and adjacent Oregon. Type locality: Klickitat County, Washington.

58. *Lomatium Cusickii* (S. Wats.) Coult. & Rose. Cusick's *Lomatium*.
Fig. 3598.

Peucedanum Cusickii S. Wats. Proc. Amer. Acad. 21: 453. 1886.

Lomatium Cusickii Coult. & Rose, Contr. U.S. Nat. Herb. 7: 226. 1900.

Cogswellia brecciarum M. E. Jones, Contr. West. Bot. No. 12: 37. 1908.

Cogswellia altensis M. E. Jones, Bull. Univ. Mont. Biol. Ser. 15: 41. 1910.

Plants caulescent, 1-2.2 dm. tall, caespitose, from long slender fusiform taproots. Leaves ternately compound; leaf-divisions few, filiform to linear, glabrous to slightly scaberulous; rays 5-12, unequal, 1-3.5 cm. long; bractlets filiform to linear-acuminate, scarious-margined; pedicels 2-6 mm. long; flowers white or purplish; fruit oblong, 11-13 mm. long, glabrous; wings about equaling the body; oil-tubes 1-3 in the intervals, 5 on the commissure.

Alpine ridges, Boreal Zones; mountains of northeastern Oregon to western Montana. Type locality: "on the highest summits of the Eagle Creek Mountains [Wallowa Mountains], Union County, Oregon." July-Sept.

59. *Lomatium laevigatum* (Nutt.) Coult. & Rose. Smooth Lomatium.
Fig. 3599.

Peucedanum laevigatum Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 627. 1840.
Lomatium laevigatum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 225. 1900.

Plants caulescent, 2.5–3.7 dm. tall, glabrous, tufted at the base. Leaves ternate, then 2–3-pinnate; leaf-divisions distinct, linear, 5–35 mm. long, acute; rays 9–20, ascending, unequal, 7–45 mm. long; bractlets usually absent; pedicels 4–10 mm. long; flowers yellow; fruit oblong, 6–10 mm. long; wings slightly narrower than to equaling the body; oil-tubes solitary in the intervals, 2 on the commissure.

Rocky bluffs and ridges, Arid Transition and Upper Sonoran Zones; Columbia River Valley, Washington and Oregon. Type locality: "Blue Mts., Oregon." April–June.

60. *Lomatium idahoense* Math. & Const. Idaho Lomatium. Fig. 3600.

Lomatium idahoense Math. & Const. Bull. Torrey Club 70: 58. 1942.

Plants caulescent or short-caulescent, glabrous, 2–4 dm. tall, from a long slender taproot. Leaves ternate-pinnate or partially bipinnate; leaf-divisions linear to oblong, 1–10 cm. long; rays 3–7, ascending, 2–8 cm. long, unequal, slender; bractlets none; pedicels 5–15 mm. long; flowers yellow; fruit narrowly oblong, acute at apex, 10–12 mm. long; wings much narrower than the body; oil-tubes solitary in the intervals, 2 on the commissure.

Gravelly slopes, Arid Transition Zone; western Idaho, and probably in adjacent Oregon, as it occurs on the Idaho side of the Snake Canyon. Type locality: Beaver Creek, 25 miles northwest of Stanley, Custer County, Idaho. May–July.

61. *Lomatium Suksdorfii* (S. Wats.) Coult. & Rose. Suksdorf's Lomatium.
Fig. 3601.

Peucedanum Suksdorfii S. Wats. Proc. Amer. Acad. 20: 369. 1885.
Lomatium Suksdorfii Coult. & Rose, Contr. U.S. Nat. Herb. 7: 239. 1900.

Plants caulescent, glabrous, 9–21 dm. tall, stems from a cluster of old leaf-sheaths. Leaves quinate, biquinate or biternate, then 1–2-pinnate; leaf-divisions remote, linear, acute, 10–30 mm. long; rays 13–25, spreading, unequal, 3–11 cm. long; bractlets linear, acuminate, subscarios, deciduous at maturity; pedicels 6–17 mm. long; flowers yellow; fruit linear-oblong, 15–32 mm. long; wings thin, narrower than the body; oil-tubes 1, rarely 3–4, in the intervals, 2 on the commissure.

Gravelly or rocky soils, Arid Transition Zone; Klickitat County, Washington. Type locality: dry rocky mountain sides, western Klickitat County, Washington. May–June.

Lomatium Suksdorfii var. *Thompsonii* Mathias, Ann. Mo. Bot. Gard. 25: 289. 1937. Foliage and stems finely and sparingly pubescent; leaves biternate, rarely quinate, then bipinnate; leaf-divisions 8–16 mm. long; bractlets longer than the flowers; ovaries and young fruit puberulent; fruit 24–28 mm. long, 8–10 mm. broad, glabrate. Wenatchee region, north-central Washington. Type locality: Pashastin, Okanogan County.

62. *Lomatium Brandegei* (Coult. & Rose) J. F. Macbride. Brandege's Lomatium. Fig. 3602.

Peucedanum Brandegei Coult. & Rose, Bot. Gaz. 13: 210. 1888.
Lomatium Brandegei J. F. Macbride, Contr. Gray Herb. No. 56: 35. 1918.

Plants caulescent, 1.5–6 dm. tall, from an elongated taproot. Stems glabrous, alternately few-branched; leaves mostly basal from a cluster of dried sheaths, ternate, then 2–3-pinnate; leaf-divisions remote, linear-lanceolate to oblanceolate, 10–40 mm. long, acute, the margins glabrous to granulate-roughened; rays 10–21, spreading, sometimes reflexed, subequal, 4–43 mm. long; bractlets linear, acute, subscarios; pedicels 0.5–5 mm. long; flowers yellow; fruit linear-oblong, 9–12 mm. long, usually reflexed; wings narrower than the body; oil-tubes 1–4, usually 3, in the intervals, 6–7 on the commissure.

Rocky mountain slopes, Arid Transition and Boreal Zones; eastern slopes of the Cascade Mountains, Wenatchee region, north-central Washington. Type locality: "Walla Walla region," Washington. May–July.

63. *Lomatium californicum* (Nutt.) Math. & Const. California Lomatium.
Fig. 3603.

Leptotaenia ? californica Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 630. 1840. Not *Peucedanum californicum* Nutt. 1840, nor Coult. & Rose, 1888.

Leptotaenia californica var. *platycarpa* Jepson, Erythraea 1: 8. 1893.

Leptotaenia californica var. *dilatata* Jepson, op. cit. 63.

Lomatium californicum Math. & Const. Bull. Torrey Club 69: 246. 1942.

Plants caulescent, glabrous and glaucous, 3–12 dm. high from stout, thickened roots, the stem arising from a clump of fibrous sheaths. Leaves 1–2-ternate or ternate-pinnate; leaf-divisions cuneate to obovate, 20–50 mm. long, usually 3-cleft and coarsely toothed or lobed, with usually obtuse lobes; rays numerous, spreading, 3–8 cm. long, often dilated into a prominent disk at base; bractlets few, linear, scarios, or none; pedicels 4–12 mm. long; flowers yellow; fruit oblong-oval, 10–15 mm. long, glabrous; wings thin to thick and corky, narrower than the body; oil-tubes 3–4 in the intervals, 6–10 on the commissure.

Moist, shaded slopes, Transition and Upper Sonoran Zones; Coast Ranges from southern Oregon to southern California. Type locality: Santa Barbara, California. April–June.

64. *Lomatium nudicaule* (Pursh) Coult. & Rose. Pestle Parsnip or Lomatium. Fig. 3604.

Smyrniolum nudicaule Pursh, Fl. Amer. Sept. 196. 1814.

Ferula Nuttallii DC. Prod. 4: 174. 1830.

Seseli leiocarpum Hook. Fl. Bor. Amer. 1: 263. 1832.

Peucedanum latifolium Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 625. 1840. Not DC. 1830.

Peucedanum robustum Jepson, Erythraea 1: 9. 1893.

Lomatium nudicaule Coult. & Rose, Contr. U.S. Nat. Herb. 7: 238. 1900.

Lomatium platyphyllum Coult. & Rose, loc. cit.

Plants acaulescent, rarely with 1 stem-leaf, 2.5–7 dm. tall, glabrous, from a long thickened taproot. Leaves 1–2-ternate, then pinnate; leaf-divisions distinct, lanceolate to broadly ovate, 1.5–9 cm. long, entire or toothed and lobed at the apex; peduncles swollen at the apex; rays 10–20, ascending, 1–20 cm. long, somewhat swollen at the apex; bractlets absent; pedicels 3–15 mm. long; flowers yellow; fruit oblong, 10–14 mm. long; wings narrower than the body; oil-tubes solitary in the dorsal intervals, 1 to several in the lateral intervals, 4–7 on the commissure.

Gravelly soils, Upper Sonoran and Transition Zones; British Columbia to central California, eastward to Alberta and western Utah. Type locality: The Dalles, on the Columbia River. April–July.

36. *HERACLEUM* L. Sp. Pl. 249. 1753.

Tall, stout, caulescent, pubescent biennials or perennials. Leaves ternately or pinnately compound; leaflets broad, serrate to variously cleft or lobed; petioles conspicuously inflated. Involucre usually none. Rays numerous. Bractlets numerous, narrow, entire. Flowers usually white, the outer petals of the marginal flowers radiant (enlarged); sepals obsolete; stylopodium conical. Fruit orbicular to obovate or elliptic, strongly flattened dorsally; dorsal ribs filiform, the lateral broadly thin-winged and nerved near the outer margin; oil-tubes large, solitary in the intervals, 2–4 on the commissure, extending only part way to the base of the fruit. [From the name for Hercules.]

A circumboreal genus of 60 species, only one of which is native to North America. Type species, *Heracleum Sphondylium* L.

1. *Heracleum lanatum* Michx. Cow-parasnip. Fig. 3605.

Heracleum lanatum Michx. Fl. Bor. Amer. 1: 166. 1803.

Heracleum Douglasii DC. Prod. 4: 193. 1830.

Plants tomentose, 10–30 dm. high. Leaves orbicular to reniform, 2–5 dm. long, ternately compound; leaf-divisions ovate to orbicular, 15–40 cm. long, cordate, coarsely serrate and variously lobed; upper stem-leaves with inflated sheaths; peduncles densely villous beneath the umbels; bracts 5–10, lanceolate-acuminate, deciduous; rays 15–30, unequal, 5–10 cm. long; fruit obovate to obcordate, 8–12 mm. long, pubescent.

Moist shade, Transition and Boreal Zones; Alaska to California, east to the Atlantic Coast. Type locality: "Canada." Feb.–June.

37. *ANGÉLICA* L. Sp. Pl. 250. 1753.

Stout and fistulose, usually erect, glabrous to tomentose perennials from stout taproots. Leaves large, ternate-pinnately or pinnately compound, with broad and distinct, serrate to lobed leaflets. Flowers in compound umbels, white, pink or purplish. Involucre usually none; involucre of numerous entire bractlets, or absent. Sepals minute or obsolete. Fruit strongly flattened dorsally; carpels with filiform to narrowly or corky-winged dorsal ribs, the laterals broadly thin- or corky-winged; stylopodium low-conical; oil-tubes numerous to few, adhering to the seed or to the pericarp. Seed flattened dorsally, the face plane to concave. [Name *angelic*, because of its cordial and medicinal properties.]

A large circumboreal genus of about 50 species. Type species, *Angelica Archangelica* L.

Oil-tubes numerous, adhering to the seed, which is free in the pericarp at maturity; fruit-ribs thick and corky, broader than the intervals. 1. *A. lucida*.

Oil-tubes few, the seed adhering to the pericarp; fruit-ribs thin.

Leaves ternate-pinnately decomposed, the division linear to linear-oblong, 2–10 cm. long, 0.2–0.8 cm. broad. 2. *A. lineariloba*.

Leaves ternately, pinnately or ternate-pinnately divided, with oval to lanceolate leaflets.

Ovaries pubescent or roughened.

Petals pubescent or scabrous dorsally; California and Nevada.

Leaves oblong; rays 7–14; fruit 4–5 mm. long, 2–3 mm. broad. 3. *A. Kingii*.

Leaves ovate to deltoid; rays 25–45; fruit 7–14 mm. long, 4–9 mm. broad.

Leaves white-tomentose beneath, green above; maritime. 4. *A. Hendersonii*.

Leaves scaberrulous to villous, but not tomentose.

Foliage glaucous, villous with some forked hairs; Coast Ranges and southern California. 5. *A. tomentosa*.

Foliage green, glabrate to somewhat villous; Sierra Nevada.

6. *A. Breweri*.

- Petals glabrous; non-Californian (except *A. genuflexa*).
 Bractlets none; leaf-divisions not reflexed; rachis not geniculate.
 Bractlets present; leaf-divisions reflexed; rachis geniculate.
 Ovaries glabrous; pedicels conspicuously webbed.
7. *A. Canbyi*.
 8. *A. genuflexa*.
 9. *A. arguta*.

1. *Angelica lucida* L. Sea-watch or Seacoast *Angelica*. Fig. 3606.

Angelica lucida L. Sp. Pl. 251. 1753.
Archangelica Gmelinii DC. Prod. 4: 170. 1830.
Archangelica peregrina Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 622. 1840.
Coelopleurum Gmelinii Ledeb. Fl. Ross. 2: 361. 1844.
Coelopleurum longipes Coult. & Rose, Contr. U.S. Nat. Herb. 7: 142. 1900.
Coelopleurum maritimum Coult. & Rose, loc. cit.
Coelopleurum actaeifolium Coult. & Rose, loc. cit.

Plants stout, 6–12 dm. tall, foliage essentially glabrous, inflorescence villous. Leaves 1–3-ternate; leaf-divisions ovate to ovate-lanceolate, 3–15 cm. long, spinulose-serrate to crenate-dentate; rays 20–45, subequal, 3–10 cm. long; bractlets numerous, linear to linear-lanceolate, villous; pedicels 5–15 mm. long; petals glabrous; ovary glabrous; fruit oblong-oval, 4–9 mm. long, glabrous; ribs about equally narrowly winged and corky-thickened, or the lateral broader than the dorsal but narrower than the body; oil-tubes small, continuous about the seed.

Coastal, Boreal and Humid Transition Zones; Alaska to northern California, also on the Atlantic Coast, from Labrador to New York; Siberia. Type locality: "Canada."

2. *Angelica lineariloba* A. Gray. Sierra *Angelica*. Fig. 3607.

Angelica lineariloba A. Gray, Proc. Amer. Acad. 7: 347. 1868.
Angelica lineariloba var. *Cuibertsonii* Jepson, Man. Fl. Pl. Calif. 728. 1925.

Plants stout, 5–15 dm. tall, foliage scabrous to glabrate, inflorescence scabrous. Leaves ternate-pinnately compound; leaf-divisions linear to linear-oblong, entire, 2–10 cm. long; rays 20–40, subequal, 3–7 cm. long; bractlets none; pedicels 3–10 mm. long; petals glabrous to scaberulous; ovary glabrous to scabrous; fruit oblong to cuneate, 10–13 mm. long; dorsal ribs narrowly winged, the lateral broader than the dorsal and about equaling the body; oil-tubes 1–2 in the intervals, 4 on the commissure.

Meadows and talus slopes, Arid Transition Zone; central and southern Sierra Nevada and the Panamint Mountains, California, to northern Nevada. Type locality: Ostrander's Meadows, Yosemite Valley, California. June–Aug.

3. *Angelica Kingii* (S. Wats.) Coult. & Rose. King's *Angelica*. Fig. 3608.

Selinum Kingii S. Wats. Bot. King Expl. 126. 1871.
Angelica Kingii Coult. & Rose, Contr. U.S. Nat. Herb. 7: 158. 1900.

Plants stout, 3–9 dm. high, foliage glabrous to scaberulous, inflorescence scaberulous to glabrous. Leaves ternate-pinnate; leaf-divisions lanceolate to ovate-lanceolate, entire to remotely serrate; rays 7–14, unequal, 0.5–10 cm. long, webbed; bractlets absent; pedicels 1–6 mm. long, webbed; petals pubescent; ovary hispid; fruit oblong, 4–5 mm. long; dorsal ribs narrowly winged, the lateral a little broader but much narrower than the body; oil-tubes 1–2 in the intervals, 2 on the commissure.

Banks of mountain streams, Transition and Boreal Zones; eastern California to Nevada and Idaho. Type locality: "East and West Humboldt Mountains and in Ruby Valley," Nevada. June–Aug.

4. *Angelica Hendersonii* Coult. & Rose. Henderson's *Angelica*. Fig. 3609.

Angelica Hendersonii Coult. & Rose, Bot. Gaz. 13: 80. 1888.

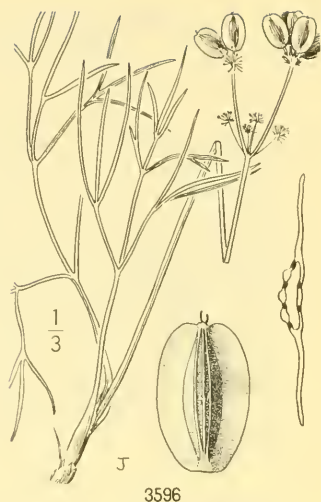
Plants stout, 3–8 dm. high, foliage white-tomentose beneath, green above, inflorescence tomentose. Leaves ternate-pinnately divided; leaf-divisions oval to ovate-lanceolate, 4–8 cm. long, serrate; rays 30–45, subequal, 2–6 cm. long; bractlets linear, tomentose; pedicels 1–8 mm. long; petals tomentose; ovary tomentose; fruit oval, 7–10 mm. long, tomentose to glabrate; dorsal ribs scarcely winged, the lateral broader and about equaling the body; oil-tubes solitary in the intervals, 4 on the commissure.

Maritime bluffs, Humid Transition Zone; southern Washington to central California. Type locality: Long Beach, Ilwaco, Pacific County, Washington. July–Sept.

5. *Angelica tomentosa* S. Wats. California *Angelica*. Fig. 3610.

Angelica tomentosa S. Wats. Proc. Amer. Acad. 11: 141. 1876.
Angelica californica Jepson, Erythra 1: 8. 1893.
Angelica tomentosa var. *californica* Jepson, Fl. W. Mid. Calif. 356. 1901.
Angelica tomentosa var. *clata* Jepson, loc. cit.

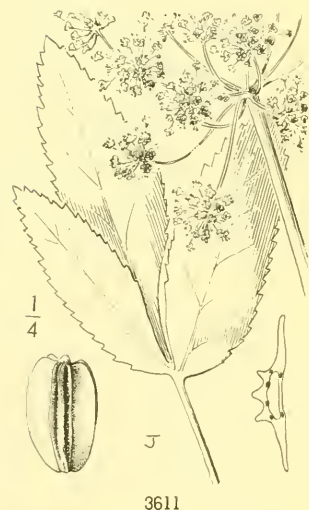
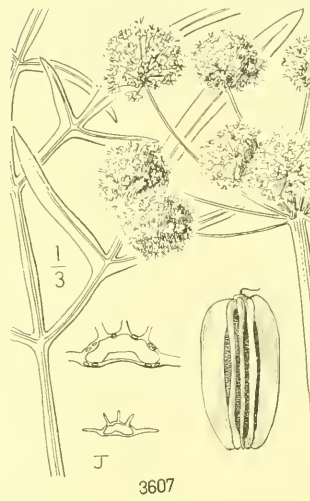
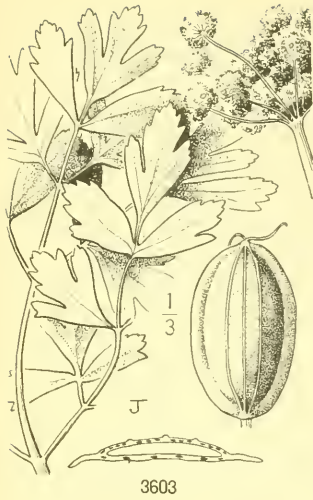
Plants stout, 6–18 dm. tall, foliage glaucous beneath and villous with occasional forked hairs, inflorescence villous. Leaves ternate-pinnately divided; leaf-divisions oval to oblong or oblanceolate, 3–15 cm. long, mucronulate-serrate; rays 25–40, unequal, 3–12 cm. long; bractlets linear or filiform, villous; pedicels 2–12 mm. long; petals villous; ovary densely villous; fruit oblong-oval, 8–10 mm. long, villous to glabrate; dorsal ribs narrowly winged, the lateral



3594. *Lomatium Hallii*
3595. *Lomatium Martindalei*
3596. *Lomatium simplex*

3597. *Lomatium triternatum*
3598. *Lomatium Cusickii*
3599. *Lomatium laevigatum*

3600. *Lomatium idahoense*
3601. *Lomatium Suksdorfii*
3602. *Lomatium Brandegei*



3603. *Lomatium californicum*
3604. *Lomatium nudicaule*
3605. *Heracleum lanatum*

3606. *Angelica lucida*
3607. *Angelica lineariloba*
3608. *Angelica Kingii*

3609. *Angelica Hendersonii*
3610. *Angelica tomentosa*
3611. *Angelica Breweri*

broader and about equaling the body; oil-tubes solitary in the intervals, 4 on the commissure.

Moist, brushy places, Transition and Upper Sonoran Zones; Coast Ranges, southern Oregon to southern California. Type locality: Crystal Springs, San Mateo County, California. June–Sept.

6. *Angelica Breweri* A. Gray. Brewer's *Angelica*. Fig. 3611.

Angelica Breweri A. Gray, Proc. Amer. Acad. 7: 348. 1868.

Plants stout, 9–12 dm. tall, foliage and inflorescence glabrate to somewhat villous. Leaves ternately or ternate-pinnately divided; leaf-divisions lanceolate, 4–12 cm. long, serrate to entire; rays 25–40, unequal, 3–8 cm. long; bractlets linear, villous; pedicels 8–12 mm. long; petals villous; ovary densely villous; fruit oblong to oval, 8–12 mm. long, more or less villous; dorsal ribs narrowly winged, the lateral broader and about equaling the body; oil-tubes solitary in the intervals, 2 on the commissure.

Rocky slopes, Boreal Zones; northern and central Sierra Nevada, California, and adjacent Nevada. Type locality: near Ebbett Pass, Alpine County, California. July–Sept.

7. *Angelica Cánbyi* Coult. & Rose. Canby's *Angelica*. Fig. 3612.

Angelica Canbyi Coult. & Rose, Rev. N. Amer. Umbell. 40. fig. 14. 1888.

Plants slender, 5–12 dm. tall, foliage scaberulous, inflorescence glabrous to sparingly scaberulous. Leaves ternate-pinnately divided; leaf-divisions ovate to lanceolate, 2–6 cm. long, serrate to lacinate-serrate and often few-lobed; rays 15–25, unequal, 2–6 cm. long, webbed; bractlets absent; pedicels 3–12 mm. long, webbed; petals glabrous; ovary tomentose to scabrous; fruit oval to oblong, 5–6 mm. long, sparingly tomentose to scabrous; dorsal ribs narrowly winged, the lateral broader and about equaling the body; oil-tubes 1–2 in the intervals, several on the commissure.

Along streams, Arid Transition Zone; central Washington and adjacent Oregon. Type locality: Klickitat River, near Mount Adams. June–Sept.

8. *Angelica genuflexa* Nutt. Kneeling *Angelica*. Fig. 3613.

Angelica genuflexa Nutt. ex. Torr. & Gray, Fl. N. Amer. 1: 620. 1840.

Angelica refracta F. Schmidt, Reisen Amurl. 127. 1868.

Plants stout, 4–18 dm. tall, foliage glabrous to scaberulous, inflorescence hispidulous to pilose. Leaves ternate-pinnate to biternate, the main divisions usually reflexed and the rachis geniculate; the ultimate divisions broadly ovate to ovate-lanceolate, 4–10 cm. long, coarsely serrate to incised; rays 22–45, unequal, 2–7 cm. long; bractlets linear to filiform, hispidulous; pedicels 5–15 mm. long; petals glabrous; ovary hispidulous; fruit nearly orbicular, 3–4 mm. long, glabrous; dorsal ribs filiform to narrowly winged, the lateral broader, about equaling the body; oil-tubes solitary in the intervals, 2 on the commissure.

Coastal marshes, Humid Transition and Boreal Zones; Alaska and the Aleutian Islands to northern California; Siberia and the Kurile Islands. Type locality: "Wappatoo [Sauvies] Island," Oregon, "and near Fort Vancouver," Washington. July–Sept.

9. *Angelica arguta* Nutt. Lyall's *Angelica*. Fig. 3614.

Angelica arguta Nutt. ex Torr. & Gray, Fl. N. Amer. 1: 620. 1840.

Angelica Lyallii S. Wats. Proc. Amer. Acad. 17: 374. 1882.

Angelica Piperi Rydb. Fl. Rocky Mts. 631. 1917.

Plants stout, 5–20 dm. tall, foliage and inflorescence glabrous to scaberulous. Leaves ternate-pinnate or bipinnate, or rarely simply pinnate; leaf-divisions ovate to lanceolate, 5–15 cm. long, spinulose-serrate; rays 18–45, subequal, 1–8 cm. long, webbed; bractlets absent, or few and filiform; pedicels 2–10 mm. long, conspicuously webbed; petals and ovary glabrous; fruit oval to orbicular or obovate, 4–7 mm. long; dorsal ribs narrowly winged, the lateral broader and about equaling the body; oil-tubes solitary in the intervals, several on the commissure.

Moist places in woods, Transition and Boreal Zones; British Columbia to northern California, east to Alberta and Wyoming. Type locality: "Wappatoo [Sauvies] Island," Oregon, "and near Fort Vancouver," Washington. July–Sept.

38. *CONIOSELINUM* Hoffm. Gen. Umbell. xxviii. 1814.

Tall, stout or slender leafy perennials, glabrous throughout or the inflorescence sometimes puberulent. Leaves ternate-pinnately compound, with dissected or lobed leaf-divisions. Involucre present or wanting; involucels of many small narrow bractlets. Flowers white; sepals obsolete. Fruit dorsally flattened, oblong-oval to oval; carpels with prominent dorsal ribs, sometimes winged, and the lateral ribs broadly winged; stylopodium conical; oil-tubes 1–2 in the intervals, and 2–4 on the commissural side. Seed with a plane or somewhat concave face. [Greek, meaning hemlock and parsley.]

A genus of several poorly differentiated species, inhabiting the boreal and north temperate regions. Type species, *Conioselinum tataricum* Hoffm.

1. *Conioselinum chinense* (L.) B.S.P. Hemlock-parsley. Fig. 3615.

Athamanta chinensis L. Sp. Pl. 245. 1753.

Selinum canadense Michx. Fl. Bor. Amer. 1: 165. 1803.

Selinum pacificum S. Wats. Proc. Amer. Acad. 11: 140. 1876.

Selinum Bentharii S. Wats. Bibl. Ind. 432. 1878.

Selinum Hookeri S. Wats. ex. Coult. & Rose, Rev. N. Amer. Umbell. 45. 1888.

Conioselinum chinense B.S.P. Prelim. Cat. N.Y. 22. 1888.

Conioselinum Gmelinii Coult. & Rose, Contr. U.S. Nat. Herb. 7: 150. 1900. Not Steud. 1840.

Stout, branching, 3–15 dm. high. Leaves ovate to deltoid, 1–2-pinnate or ternate-pinnate; leaf-divisions lanceolate to ovate, 1–4.5 cm. long, pinnatifid, the lobes acute, entire or toothed; cauline leaves with dilated sheaths; bracts foliaceous or replaced by leaves, or involucre none; bractlets few to numerous, scarious-margined, linear; rays 13–30, 1.5–4.5 cm. long; pedicels 5–8 mm. long; fruit oblong-oval to oval, 4–6 mm. long; dorsal ribs acute, the laterals broadly winged.

Cold marshes, Transition and Boreal Zones; Pacific Coast from Alaska to California, also on the Atlantic Coast and Siberia. Type locality: "Genesee County," western New York (Missread as "Chinese," gives the plant its specific name!). July–Sept.

39. *SPHENOSCIADIUM* A. Gray, Proc. Amer. Acad. 6: 536. 1865.

Thick-rooted perennials, with stout nearly simple stems, glabrous up to the tomentose inflorescence. Leaves 1–2 pinnately, or ternate-pinnately compound, with bladdery, dilated petioles. Involucre none; involuclers of numerous deciduous linear-setaceous bractlets. Umbels compound, rather long-rayed; umbellets capitate, with crowded sessile flowers. Sepals obsolete. Flowers scarious, white or purplish. Fruit strongly flattened dorsally, cuneate-obovate; carpels ribbed at base, winged above. Stylopodium small, conical; oil-tubes solitary in the intervals, 2 on the commissure. Seed-face plane. [From the two Greek words meaning wedge and umbrella, referring to the umbel.]

A single species, native of western North America.

1. *Sphenosciadium capitellatum* A. Gray. *Sphenosciadium* or Swamp White-heads. Fig. 3616.

Sphenosciadium capitellatum A. Gray, Proc. Amer. Acad. 6: 537. 1866.

Selinum eryngiifolium Greene, Pittonia 2: 102. 1890.

Selinum validum Congdon, Erythra 7: 185. 1900.

Sphenosciadium capitellatum var. *scabrum* Jepson, Man. Fl. Pl. Calif. 729. 1925.

Stems stout, 5–18 dm. high. Leaves large, often 1–4 dm. long, scabrous to glabrate; leaf-divisions linear-oblong to ovate-lanceolate, 1–12 cm. long, remotely serrate to coarsely dentate, incised or pinnatifid; rays 4–18, about equal, 1.5–10 cm. long, densely tomentose; umbellets globose; flowers sessile, pubescent; fruit cuneate-obovate, 5–8 mm. long.

Moist places, Arid Transition and Canadian Zones; eastern Oregon to southern California, east to Idaho and western Nevada. Type locality: near Ebbett Pass, Sierra Nevada, California. July–Aug.

40. *GLÉHNIA* F. Schmidt ex Miq. Ann. Mus. Bot. Lugd.-Batav. 3: 61. 1867.

Low somewhat fleshy maritime herbs, from a stout taproot. Leaves petiolate, 1–2-ternate or ternate-pinnate, broadly ovate. Peduncles stout, villous, mostly shorter than the leaves. Involucre with a few linear bracts or wanting; involucler with several linear-lanceolate bractlets. Flowers white; calyx-teeth minute; stylopodium none. Fruit ovoid-oblong to orbicular, flattened dorsally; lateral and dorsal wings present and conspicuous, thickened at the base; oil-tubes large, numerous. [Meaning of name not explained in original publication; possibly in honor of P. von Glehn, curator, Botanic Garden, St. Petersburg.]

A genus of 2 species inhabiting the Pacific shores of western North America and eastern Asia. Type species, *Glehnia littoralis* Schmidt.

1. *Glehnia leiocarpa* Mathias. American Glehnia. Fig. 3617.

Glehnia littoralis of American authors, not of Schmidt, 1867.

Glehnia leiocarpa Mathias, Ann. Mo. Bot. Gard. 15: 95. pl. 17, figs. 1, 4; pl. 19, fig. 2. 1928.

Low nearly stemless perennial, the sheathing petioles usually buried in the sand. Leaves widely spreading, usually prostrate, broadly ovate, 2.5–15 cm. long, the petioles stout, 2.5–15 cm. long, tomentose, the blades ternate; leaf-divisions ovate, often 3-lobed or 3-divided, irregularly serrate with callous teeth, thick, green and glabrous or glabrate above, densely white-tomentose beneath; peduncles stout; rays 5–13, stout, 0.5–4.5 cm. long, woolly; fruit 4–12 mm. long, glabrous or sparsely hairy at apex, the wings conspicuous, corky.

Drifting sands along the seashore, Humid Transition and Boreal Zones; Yakutat Bay, Alaska to Mendocino County, California. Type locality: Shoalwater Bay, Washington. May–July.

41. *PTERÝXIA* Nutt. ex Coult. & Rose, Contr. U.S. Nat. Herb. 7: 170. 1900.

Low caespitose perennials, with a deep-seated root, the stems clothed at base with the persistent petiolar sheaths. Leaves 1–2-pinnately or ternate-pinnately decomposed into

small linear, often pungent, divisions. Involucre none; involucels of narrow herbaceous bractlets. Flowers yellow or rarely white or purple; sepals prominent. Fruit narrowly oblong to ovoid, flattened dorsally; lateral ribs winged, thin, some or all of the dorsal similarly winged. Stylopodium none. Oil-tubes 1 to several in the intervals, several on the commissure. Seed-face plane or shallowly concave. [Name from the two Greek words, *Pteris*, meaning fern, and *ixia*, the chameleon plant.]

A genus of 5 species, natives of western North America. Type species, *Selinum terebinthinum* Hook.

Leaves ovate to ovate-long, pinnately or ternate-pinnately decomposed.

Leaves narrowly oblong, ternate-pinnate or 2-3-pinnate.

1. *P. terebinthina*.

2. *P. petraea*.

1. *Pteryxia terebinthina* (Hook.) Coult. & Rose. Terebinth *Pteryxia*. Fig. 3618.

Selinum terebinthinum Hook. Fl. Bor. Amer. 1: 266. pl. 95. 1832.

Pteryxia terebinthina Coult. & Rose, Contr. U.S. Nat. Herb. 7: 171. 1900.

Plants short-stemmed, 1-6 dm. high. Leaves coriaceous, ovate-oblong to broadly ovate, 3-18 cm. long, 3-12 cm. broad, pinnately or ternate-pinnately decomposed, the ultimate divisions linear to subcuneate, 1-4 mm. long, acute and mucronulate, more or less confluent; peduncles stout, exceeding the leaves; involucre usually none; rays 7-24, unequal, 0.5-7 mm. long; bractlets linear to rarely obovate, about equaling the flowers; fruit ovoid to ovoid-oblong, 7-11 mm. long; lateral wings thin, usually undulate-cripsed, the dorsal similar.

Dry, usually sandy or gravelly soils, Upper Sonoran and Arid Transition Zones; Yakima and Franklin Counties, eastern Washington, to the John Day Valley, eastern Oregon. Type locality: "on the sandy grounds of the Wallawallah River." May-July.

Pteryxia terebinthina var. *foeniculacea* (Torr. & Gray) Mathias, Ann. Mo. Bot. Gard. 17: 332. 1930. (*Cymopterus foeniculaceus* Torr. & Gray, Fl. N. Amer. 1: 624. 1840; *Cymopterus thapsioides* Nutt. op. cit. 625.) Leaves greener and less rigid; umbels compact; fruit 5-10 mm. long, 3-4 mm. broad; wings plane. Sherman County, eastern Washington, to Deschutes County, Oregon, east to Idaho, Montana, and Utah. Type locality: "on rocks, Blue Mountains of Oregon."

Pteryxia terebinthina var. *californica* (Coult. & Rose.) Mathias, op. cit. 337. (*Pteryxia californica* Coult. & Rose, Contr. U.S. Nat. Herb. 7: 172. 1900.) Leaves gray-green, the divisions a little broader and less rigid than the typical species; rays slightly longer; fruit 5-10 mm. long, wings little or not at all undulate-cripsed. Arid Transition and Canadian Zones; Siskiyou Mountains to central California in the Coast Ranges and Sierra Nevada. Type locality: Sisson, Siskiyou County, California.

2. *Pteryxia petraea* (M. E. Jones) Coult. & Rose. Rock *Pteryxia*. Fig. 3619.

Cymopterus petraeus M. E. Jones, Contr. West. Bot. No. 8: 32. 1898.

Pteryxia petraea Coult. & Rose, Contr. U.S. Nat. Herb. 7: 172. 1900.

Herbaceous stems slender, usually several from the crown of the elongate woody taproot, 1.5-4.5 dm. high. Leaves pale green, narrowly oblong in outline, 3.5-17 cm. long, ternate-bipinnate to 3-pinnate, the main divisions distant; ultimate divisions linear, 1-8 mm. long, 0.5-1 mm. broad; peduncles exceeding the leaves; rays 3-7, unequal, the outer 3-5 cm. long, the inner much reduced; bractlets linear, 1-3 mm. long; fruit ovoid to ovoid-oblong, 4.5-7 mm. long; lateral wings narrower than to equaling the width of the body, 1-3 of the dorsal ribs similarly winged; oil-tubes usually 3 in the intervals, 5-15 on the commissure.

Rocky cliffs or canyon walls, Arid Transition and Canadian Zones; Alvord Desert and Steins Mountains, eastern Oregon, and Inyo and White Mountains, California, east to Idaho and Nevada. Type locality: Palisade, Nevada. June-July.



3612. *Angelica Canbyi*

3613. *Angelica genuflexa*

3614. *Angelica arguta*

42. *CYMOPTERUS* Raf. Journ. Phys. 89: 100. 1819.

Acaulescent or short-caulescent perennial herbs, with a deep-seated thickened root, the stems mainly subterranean (pseudoscares) bearing the tuft of leaves and peduncles at the surface of the ground. Leaves variously lobed, divided or decomposed, glabrous or pubescent, thin to subcoriaceous, petiolate. Umbels congested and globose, or spreading; involucre present or absent; involucels usually present, the bractlets conspicuous, herbaceous or partly scarious to hyaline. Flowers yellow, white or purple; sepals small or obsolete; stylopodium wanting. Fruit ovoid to oblong, somewhat flattened dorsally, all the ribs conspicuously winged, or the dorsal ones sometimes wingless by abortion, the wings thin, or thickened and corky toward the outer edge; oil-tubes small, 1 to many in the intervals, 2 to many on the commissure. [Name Greek, from words meaning wave and wing.]

A genus of about 30 species, inhabiting western North America. Type species *Selinum acaule* Pursh.

Umbels congested and globose, the rays obsolete; bractlets scarious and paleaceous.

Leaves and peduncles from the crown of the root; oil-tubes many in the intervals.

Fruit glabrous; leaves hirtellous.

1. *C. cinerarius*.

Fruit pubescent; leaves glabrous.

2. *C. deserticola*.

Leaves and peduncles arising from a slender subterranean pseudoscape; oil-tubes usually solitary in the intervals.

3. *C. globosus*.

Umbels not globose, the rays evident; bractlets not paleaceous.

Bracts scarious, united; bractlets conspicuous, hyaline.

Bractlets white or whitish, few-nerved; pedicels 3–12 mm. long.

10. *C. purpurascens*.

Bractlets purple or greenish white, many-nerved; pedicels less than 1 mm. long to obsolete.

11. *C. multinervatus*.

Bracts usually wanting, never scarious; bractlets inconspicuous or if conspicuous never hyaline.

Pseudoscape conspicuous; bractlets conspicuously foliaceous.

6. *C. acaulis*.

Pseudoscape absent or very short; bractlets not conspicuously foliaceous.

Leaves scabrous to hirtellous.

Leaves oblong; fruit ovoid to oblong; 6–11 mm. long, 5–8 mm. broad, the wings about twice the width of the body.

8. *C. aboriginum*.

Leaves narrowly oblong; fruit ovoid, 3–6 mm. long and broad, the wings narrower than the body.

9. *C. bipinnatus*.

Leaves glabrous.

Leaves simply ternate or pinnate, the divisions broad.

Leaves orbicular-reniform; fruit-wings plane.

4. *C. Gilmanii*.

Leaves oblong-ovate; fruit-wings corrugated.

5. *C. corrugatus*.

Leaves ternate-pinnately decomposed, the divisions linear.

7. *C. panamintensis*.

1. *Cymopterus cinerarius* A. Gray. Gray's *Cymopterus*. Fig. 3620.

Cymopterus cinerarius A. Gray, Proc. Amer. Acad. 6: 535. 1866.

Plants acaulescent, the leaves and peduncles arising directly from the root-crown, 0.7–0.8 dm. high. Leaves oblong-ovate, 15–25 mm. long, cinereous-hirtellous, 2-pinnate; leaf-divisions entire to pinnately lobed; ultimate divisions approximate, distinct, oblong-lanceolate, apiculate, 1–3 mm. long; petioles 3–5 cm. long, glabrous or sparsely hirtellous; peduncles exceeding the leaves, glabrous; umbel small, discoid, the rays obsolete; bracts united below the middle, triangular-lanceolate, acute, scarious-margined; flowers white; fruit narrowly cuneate, 6 mm. long, glabrous; wings a little constricted at the base in cross section, the dorsal and lateral similar.

Alpine ridges, Boreal Zones; Sonora Pass, Sierra Nevada, and the Sweetwater and White Mountains, California, and adjacent Nevada. Type locality: Sonora Pass. June–Sept.

2. *Cymopterus deserticola* Brandg. Desert *Cymopterus*. Fig. 3621.

Cymopterus deserticola Brandg. Univ. Calif. Pub. Bot. 6: 168. 1915.

Plants acaulescent the leaves and peduncles arising from the root-crown, 10–15 cm. high, glabrous. Leaves broadly oblong-ovate, 2–6.5 cm. long, glaucous and glabrous, ternate-bipinnate; leaflets entire to pinnately lobed; ultimate divisions 1–4 mm. long, 1–2 mm. broad, apiculate; petioles about as long as the blade; peduncles exceeding the leaves; umbel compact, globose, discoid; involucre none; bractlets paleaceous, mostly aborted; flowers purple; fruit oblong-ovoid to cuneate, pubescent, 5–7 mm. long; lateral wings narrower than the body, the dorsal absent or reduced.

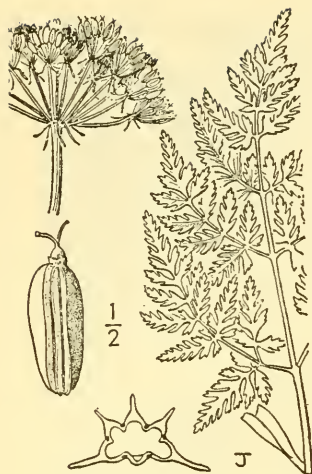
Loose sandy or gravelly soil, Lower Sonoran Zone; Mojave Desert, California. Type locality: Kramer, California. April–May.

3. *Cymopterus globosus* S. Wats. Globose *Cymopterus*. Fig. 3622.

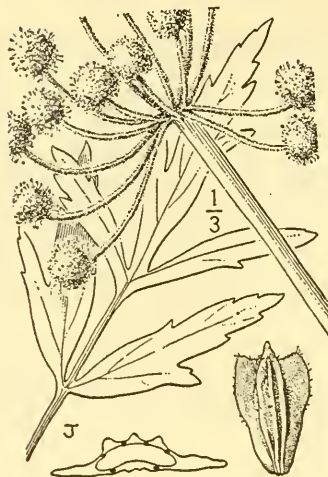
Cymopterus montanus var. *globosus* S. Wats. Bot. King Expl. 124. 1871.

Cymopterus globosus S. Wats. Proc. Amer. Acad. 11: 141. 1876.

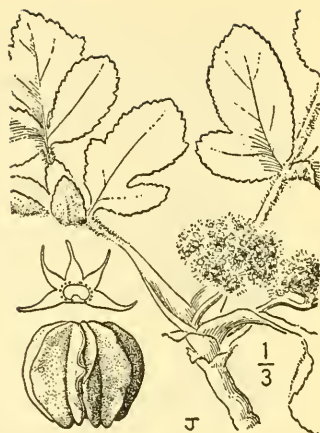
Peduncles and leaves produced at the surface of the ground on a slender subterranean stem arising from the deep-seated root. Leaves glabrous and glaucous, ternate-bipinnate or bipinnate, broadly ovate in outline, 2–7 cm. long, blades usually longer than the petioles; leaflets pinnately incised or lobed; ultimate divisions apiculate, 0.5–6 mm. long; peduncles exceeding the leaves; umbels compact, globose, 2–3 cm. in diameter; involucre none; bractlets scarious,



3615



3616



3617



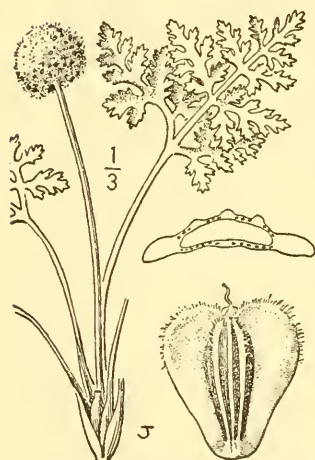
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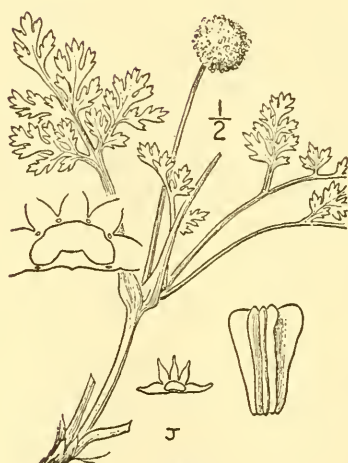
3619



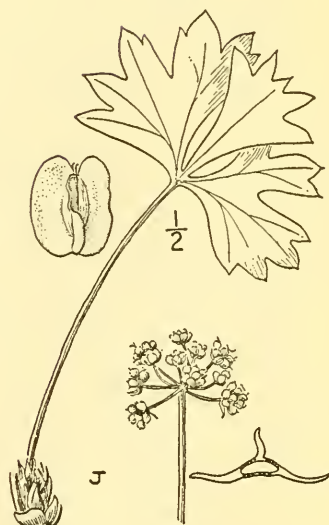
3620



3621



3622



3623

3615. *Conioselinum chinense*
 3616. *Sphenosciadium capitellatum*
 3617. *Glehnia leiocarpa*

3618. *Pteryxia terebinthina*
 3619. *Pteryxia petraea*
 3620. *Cymopterus cinerarius*

3621. *Cymopterus deserticola*
 3622. *Cymopterus globosus*
 3623. *Cymopterus Gilmanii*

linear; flowers white or purple; fruit glabrous, narrowly cuneate, 6–11 mm. long; lateral wings broadest at the apex, dorsal wings usually 3, similar to the lateral.

Rocky ridges, Upper Sonoran Zone and Arid Transition Zones; Nevada and western Utah, reaching the eastern border of California. Type locality: Carson City, Nevada. March–May.

4. *Cymopterus Gilmanii* Morton. Gilman's Cymopterus. Fig. 3623.

Cymopterus Gilmanii Morton, Journ. Wash. Acad. 25: 309. 1935.

Plant subcaulescent, glabrous, 1.2–2.3 dm. high. Leaves orbicular-reniform, 2.5–4.5 cm. long, ternate; leaf-divisions deltoid or triangular, spinulose-dentate, acuminate, confluent, up to 8–18 mm. long; peduncles exceeding the leaves; rays about 8, 1–2 cm. long; involucre none; bractlets several, distinct, linear-subulate, exceeding the purple or purplish-white flowers; fruit broadly oval, 7–8 mm. long, the wings broader than the body, narrowed or broadened at the base.

Desert canyons, Sonoran Zones; mountains about Death Valley, California and Nevada. Type locality: Echo Canyon, Funeral Mountains, California. April.

5. *Cymopterus corrugatus* M. E. Jones. Corrugate-winged Cymopterus. Fig. 3624.

Cymopterus corrugatus M. E. Jones, Amer. Nat. 17: 973. 1883.

Plants acaulescent, or with a pseudoscape, glabrous, 3–10.5 cm. high. Leaves oblong-ovate, 0.5–4 cm. long, pinnate; leaflets pinnately lobed, the lobes obtuse; peduncles shorter than to equaling the leaves; rays 4–10, 0.2–1 cm. long; involucre none; bractlets several, scarious to submembranaceous, entire, shorter than the white flowers; fruit ovoid-oblong, 3–5 mm. long, the wings thin and corrugated, constricted at the base, narrower than the body.

Rocky ridges, Upper Sonoran Zone; southeastern Oregon to northern Nevada. Type locality: Humboldt Lake, Nevada. April–May.

6. *Cymopterus acaulis* (Pursh) Raf. Mahas Cymopterus. Fig. 3625.

Selinum acaule Pursh, Fl. Amer. Sept. 732. 1814.

Thapsia glomerata Nutt. Gen. 1: 184. 1818.

Ferula ? *Palmella* Hook. Fl. Bor. Amer. 1: 268. 1832.

Cymopterus acaulis Raf. Herb. Raf. 40. 1833.

Coloptera Parryi Coult. & Rose, Rev. N. Amer. Umbell. 50. 1888.

Cymopterus Leibergii Coult. & Rose, Contr. U.S. Nat. Herb. 7: 182. 1900.

Plants acaulescent or subcaulescent, not caespitose, with the development of a pseudoscape 0.3–3 dm. tall. Leaves ovate to oblong-obovate, 1–9 cm. long, 0.5–7 cm. broad, bipinnate; leaflets entire to pinnately lobed, the lobes acute or somewhat obtuse, 0.5–30 mm. long; petiole 1–14 cm. long; peduncles usually shorter than or equaling the leaves; rays 3–5, 0.2–1 cm. long; involucre wanting, or rarely vestigial; bractlets usually linear, entire, obtuse, often membranaceous, occasionally scarious-margined, equaling or exceeding the white flowers; fruit ovoid to oblong-ovoid, 5–10 mm. long, the wings constricted at base and sometimes acuminate at apex, narrower than or equaling the body; dorsal wings 1–3, similar to the lateral; oil-tubes 3–17 in the intervals.

Dry plains and hills, Arid Transition and Upper Sonoran Zones; eastern Oregon to central Saskatchewan and western Minnesota to southern Colorado and Utah. Type locality: "On the alluvion of the Missouri, from the river Naduet to the Mahas, in upper Louisiana." April–June.

Cymopterus Watsonii (Coult. & Rose) M. E. Jones, Contr. West. Bot. No. 12: 25. 1908. (*Aulospermum Watsonii* Coult. & Rose, Contr. U.S. Nat. Herb. 7: 176. 1900.) Subcaulescent with a conspicuous pseudoscape, scabrous-puberulent; leaves ovate-oblong, 3–8 cm. long, bipinnate, fleshy, pallid, and glaucescent; leaflets pinnately lobed, the lobes linear, 1–2 mm. long, confluent; peduncles exceeding the leaves; rays several, 1–3 cm. long; involucre wanting; bractlets linear, acute, about equaling the white flowers; fruit ovoid to ovoid-oblong, 4–6 mm. long, 3–6 mm. broad; wings narrowed at the base. This species, previously known only from northern Nevada, has recently been collected in southeastern Oregon. Type locality: Battle Mountain, Nevada.

7. *Cymopterus panamintensis* Coult. & Rose. Panamint Indian Parsnip. Fig. 3626.

Cymopterus panamintensis Coult. & Rose, Contr. U.S. Nat. Herb. 4: 116. 1893.

Plants acaulescent, glabrous, 0.5–4 dm. high. Leaves broadly ovate-oblong, 1–14 cm. long, ternate, then 2–3-pinnate; leaf-divisions linear, sharply acute or short-acuminate, spinulose, distinct, 1–5 mm. long; peduncles exceeding the leaves, rather stout; rays 5–15, 1–6.5 cm. long; involucre none; bractlets several, more or less united, linear-attenuate, equaling or exceeding the greenish flowers; fruit oblong-ovoid, 6–10 mm. long, the wings equaling or exceeding the body, thin, enlarged at the base; seed-face concave.

Rocky situations, Upper Sonoran and Arid Transition Zones; desert ranges bordering Death Valley, California. Type locality: "near Pete's garden in Johnson Canyon," Panamint Mountains, California. March–May.

Cymopterus panamintensis var. *acutifolius* (Coult. & Rose) Munz, Man. S. Calif. 357. 1935. (*Aulospermum panamintense* var. *acutifolium* Coult. & Rose, Contr. U.S. Nat. Herb. 7: 177. 1900.) Leaf-divisions more remote; ultimate divisions acute, not spinulose, 3–20 mm. long. Mojave Desert, near Barstow and Newberry and Grapevine Mountains, California. Type locality: Newberry Springs, Mojave Desert, California.

8. *Cymopterus aboriginum* M. E. Jones. Indian Parsnip. Fig. 3627.

Cymopterus aboriginum M. E. Jones, Contr. West. Bot. No. 12: 22. 1908.

Plants acaulescent, the leaves and peduncles arising from the short rootstock clothed with persistent bases of the petioles, 1–3.5 dm. high. Leaves oblong, 3–10 cm. long, on petioles of about equal length, glaucous and hirtellous, ternate-bipinnate or 3-pinnate; leaf-divisions entire to pinnately lobed; ultimate divisions broadly linear, acute, distinct or some confluent, 2–8 mm. long; peduncles glabrous, equaling or exceeding the leaves; rays 3–10, spreading, 4–20 mm. long; bracts, when present, few, linear; bractlets several, linear-attenuate, slightly scarious, about equaling or shorter than the white flowers; fruit ovoid to oblong, 6–11 mm. long; wings about twice as broad as the body, thin; seed-face slightly concave.

Rocky ridges and slopes, mainly Arid Transition Zone; vicinity of Mono Lake, to the Panamint Mountains, California, and the Charleston Mountains, Nevada. Type locality: Indian Spring, Charleston Mountains. April–May.

9. *Cymopterus bipinnatus* S. Wats. Hayden's *Cymopterus*. Fig. 3628.

Cymopterus bipinnatus S. Wats. Proc. Amer. Acad. 20: 368. 1885.

Cynomarathrum Macbridei A. Nels. Bot. Gaz. 54: 142. 1912.

Plants caespitose, acaulescent, 0.2–2.6 dm. high. Leaves narrowly oblong, 1.5–6.5 cm. long, bipinnate, gray-green, rough-puberulent; the leaf-divisions entire to pinnately lobed, the lobes obtuse, crowded, 1–4 mm. long; petioles 2–9 cm. long; peduncles greatly exceeding the leaves; involucre none; rays 3–5, 1–17 mm. long; bractlets linear, acute, about equaling the flowers; flowers white; fruit ovoid-oblong, 3–6 mm. long, the wings often broader at base, narrower than the body.

Rocky ridges, Arid Transition Zone; eastern Oregon to Montana, Nevada and Utah. Type locality: "Rocky Mountains south of Virginia City, Montana, by Prof. Hayden in 1871." May–June.

10. *Cymopterus purpurascens* (A. Gray) M. E. Jones. Purple *Cymopterus*. Fig. 3629.

Cymopterus montanus var. *purpurascens* A. Gray, Bot. Ives Exped. 15. 1860.

Cymopterus purpurascens M. E. Jones, Zoe 4: 277. 1893. Not M. E. Jones, 1895.

Cymopterus utahensis M. E. Jones, Proc. Calif. Acad. II, 5: 684. 1895.

Acaulescent or subcaulescent, 3–15 cm. high from a slender taproot crowned with persistent leaf-bases, glabrous. Leaves ovate-oblong, 1.2–5 cm. long, bipinnate or pinnate or occasionally ternate-pinnate, pallid, fleshy; leaf-divisions entire to pinnately lobed, the lobes rounded to acute, 1–8 mm. long; petioles 1–4 cm. long; peduncles 1.5–7 cm. long; involucre of conspicuous white bracts, connate below the middle, 1–5-nerved; rays 3–5, 4–10 mm. long; bractlets similar to the bracts, 1–5-nerved, equaling or exceeding the purplish flowers; fruit broadly ovoid, 8–18 mm. long, the wings twice or thrice the width of the body, narrow to slightly enlarged at base.

Desert ranges, Sonoran Zones; southeastern California to Arizona, north to Idaho and Utah. Type locality: "Oryabe, New Mexico." March–May.

11. *Cymopterus multinervatus* (Coul. & Rose) Tidestrom. Arizona *Cymopterus*. Fig. 3630.

Cymopterus purpurascens M. E. Jones, Proc. Calif. Acad. II, 5: 687. 1895. Not M. E. Jones, 1893.

Phellopterus multinervatus Coul. & Rose, Contr. U.S. Nat. Herb. 7: 169. 1900.

Cymopterus multinervatus Tidestrom, Proc. Biol. Soc. Wash. 48: 41. 1935.

Subterranean stems usually several, 0.4–2 dm. high, from the stout taproot. Leaves ovate-oblong, glabrous, 1–2-pinnate or occasionally ternate-pinnate, pale glaucous-green, 1–8.5 cm. long, about equalled by the petioles; leaf-divisions entire to pinnately lobed; lobes confluent; peduncles 2–14 cm. high; bracts forming a scarious sheath, or of 1 or 2 nerved bracts, or a conspicuous cup; rays 1–5, 5–25 mm. long; involucre of several, broad, purple, sometimes white-margined, several-nerved bractlets united at the base, about equaling the purple flowers; fruit ovoid to ovoid-oblong, 8–17 mm. long; wings slightly enlarged at base, twice or thrice the width of the body.

Dry desert plains and hills, Sonoran Zones; desert slopes of the San Bernardino Mountains and the New York Mountains, California, to Utah, western Texas and Sonora. Type locality: Peach Springs, northern Arizona. March–April.

43. *ERYNGIUM* L. Sp. Pl. 232. 1753.

Creeping to erect, herbaceous, usually glabrous biennials or perennials from taproots or clusters of fibrous roots. Leaves entire, pinnately or palmately lobed to divided, blades sometimes obsolete; petioles sheathing, sometimes septate. Inflorescence capitate, the heads solitary, cymose or racemose; involucre of entire or lobed bracts subtending the head. Bractlets entire or lobed, subtending the white, blue or purple flowers. Sepals conspicuous, entire to spinescent. Rays and pedicels none. Stylopodium none, the styles shorter or longer than the persistent sepals. Fruit globose to ovoid, slightly flattened laterally if at all, variously covered with scales or tubercles, the ribs obsolete. Oil-tubes inconspicuous. [Name Greek, of uncertain origin.]

About 200 species, distributed through the temperate and subtropical regions of the earth. Type species, *Eryngium foetidum* L.

Heads pale blue to amethystine.

Basal leaves with elongate septate petioles greatly exceeding the small lanceolate to ovate blades; bracts and bractlets not callous-margined. 1. *E. articulatum*.

Basal leaves with non-septate petioles shorter than to equaling the blades; bracts and bractlets callous-margined. 2. *E. armatum*.

Heads greenish, never blue.

Basal leaves bladeless or with elongate, usually septate petioles, much longer than the small blades.

Bracts obscurely callous-margined, about twice as long as the heads; styles shorter than the sepals. 4. *E. petiolatum*.

Bracts not callous-margined, usually less than twice as long as the heads; style equaling or exceeding the sepals.

Bractlets usually scarious-margined at the base; fruit with subequal scales.

Leaf-blades 3–15 cm. long, 1–3 cm. broad; inflorescence cymose; bracts spinose-ciliate; bractlets spinose to entire. 5. *E. alismaefolium*.

Leaf-blades 2–3 cm. long, 4–6 mm. broad; inflorescence falsely racemose; bracts with several lateral spines near the base; bractlets entire. 6. *E. racemosum*.

Bractlets usually scarious-lobed at base; fruit with unequal scales. 7. *E. aristulatum*.

Basal leaves with usually non-septate petioles, shorter than to only slightly exceeding the blades.

Leaves definitely callous-margined. 3. *E. pinnatisectum*.

Leaves not callous-margined.

Bracts and bractlets callous-margined, usually entire. 2. *E. armatum*.

Bracts and bractlets not callous-margined, usually spinose to lobed.

Leaf-blades deeply pinnatifid, the lobes usually remote, spinulose-lobed to pinnatifid. 8. *E. Vascyi*.

Leaf-blades coarsely serrate, incised to pinnatifid, the teeth or lobes proximate, entire to spinose.

Basal leaves with lanceolate or oval blades, 2–6 cm. long, 1–2 cm. broad; inflorescence puberulent. 7. *E. aristulatum*.

Basal leaves with ovate-lanceolate to oblanceolate blades, 3–25 cm. long, 0.5–3 cm. broad; inflorescence glabrous.

Bractlets scarious-lobed at base; fruit with unequal scales. 7. *E. aristulatum*.

Bractlets scarious-winged at base; fruit with subequal scales. 5. *E. alismaefolium*.

1. *Eryngium articulatum* Hook. Eryngo or Coyote-thistle. Fig. 3631.

Eryngium articulatum Hook. Lond. Journ. Bot. 6: 232. 1847.

Eryngium Harknessii Curran, Bull. Calif. Acad. 1: 153. 1885.

Eryngium articulatum var. *Bakeri* Jepson, Madroño 1: 104. 1923.

Plants stout, erect, 3–10 dm. high. Basal leaves elongate, the petioles septate, 1–3 (or 6) dm. long, greatly exceeding the abortive lanceolate or ovate, entire or spinose blades; cauline leaves similar but sessile, often laciniate at base; inflorescence cymose, the large heads numerous, pedunculate, ovoid, 1–2 cm. long, bright blue; bracts rigid, reflexed, linear-lanceolate, spinose-ciliate and scarious-dilated at base, about equaling the heads; bractlets tricuspidate at apex, exceeding the fruit; sepals linear-lanceolate, usually entire; styles equaling or exceeding the sepals; fruit ovoid, 2–3 mm. long, densely covered with appressed, white, acuminate lanceolate scales.

Wet ground, the basal leaves often submerged when young, Transition and Upper Sonoran Zones; central California to northern Idaho. Type locality: "stony edges of the Spokane River, and Skitsoe and Coeur d'Alene Lakes, Idaho."

2. *Eryngium armatum* (S. Wats.) Coult. & Rose. Prickly Eryngo or Coyote-thistle. Fig. 3632.

Eryngium petiolatum var. *armatum* S. Wats. Bot. Calif. 1: 255. 1876.

Eryngium armatum Coult. & Rose, Bot. Gaz. 13: 141. 1888.

Eryngium longistylum Coult. & Rose, Contr. U.S. Nat. Herb. 7: 55. 1900.

Eryngium Harmsianum Wolff, Rep. Spec. Nov. 8: 415. 1910.

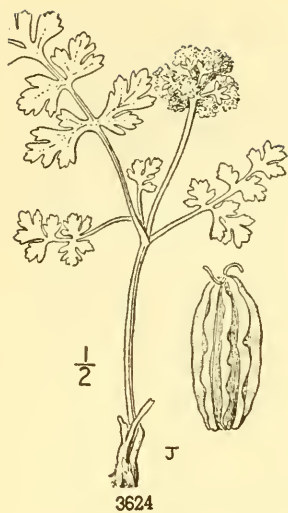
Plants low, diffusely branched, 0.5–4 dm. high. Basal leaves rosulate, thick, oblanceolate, 0.5–3 dm. long, remotely serrate to coarsely spinose-incised, narrowed to a short margined petiole; cauline leaves narrower, sessile; inflorescence cymose, the numerous heads sessile or short-pedunculate, 5–15 mm. in diameter, yellowish or occasionally bluish; bracts lanceolate, callous-margined, usually entire, much exceeding the heads, often scarious-winged at base; bractlets similar, scarious-winged at base, enfolding and exceeding the fruit; sepals ovate-lanceolate, entire; styles shorter than to considerably exceeding the sepals; fruit ovoid, 1.5–3 mm. long, densely covered with flat, white or brown scales, largest on upper portion of fruit.

Low ground near the coast, mainly Humid Transition Zone; northern and central California coast, inland in the vicinity of San Francisco Bay. Type locality: "Monterey to Humboldt County." May–Aug.

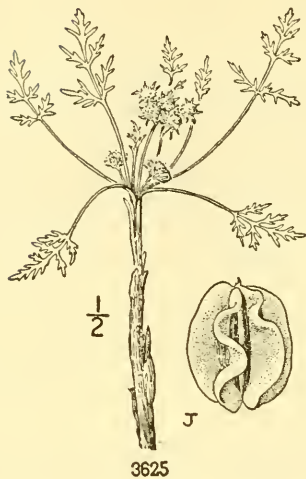
3. *Eryngium pinnatisectum* Jepson. Tuolumne Eryngo or Coyote-thistle. Fig. 3633.

Eryngium pinnatisectum Jepson, Madroño 1: 105. 1923.

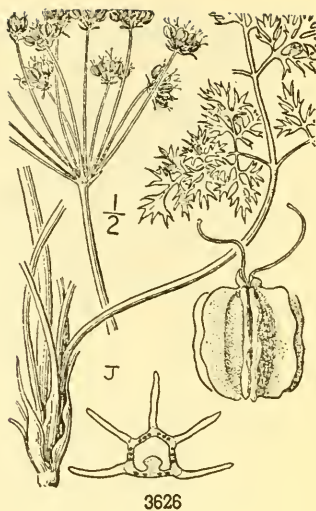
Plants stout, erect, branching above, 1–4 dm. high. Basal leaves lanceolate, 1–3 dm. long, tapering to a winged petiole, pinnatifid to the midrib, the lobes callous-margined, entire or



3624



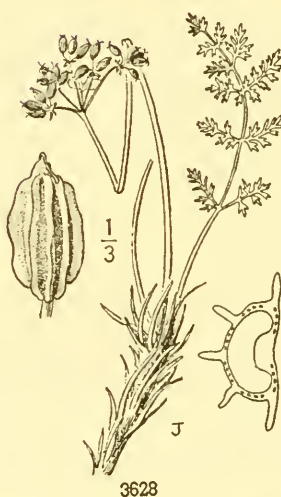
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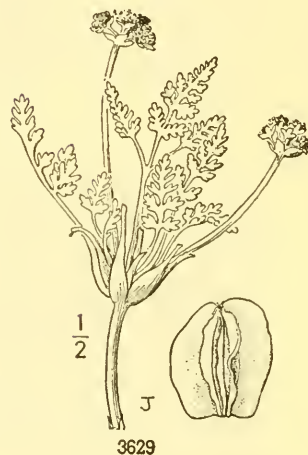
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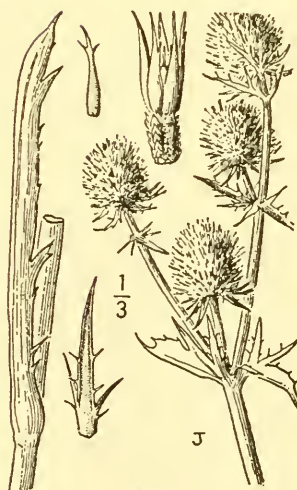
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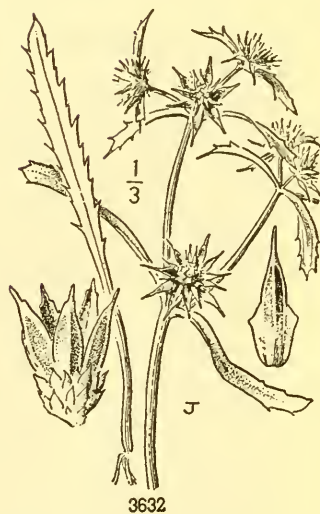
3629



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3624. *Cymopterus corrugatus*3625. *Cymopterus acaulis*3626. *Cymopterus panamintensis*3627. *Cymopterus aboriginum*3628. *Cymopterus bipinnatus*3629. *Cymopterus purpurascens*3630. *Cymopterus multinervatus*3631. *Eryngium articulatum*3632. *Eryngium armatum*

somewhat spinose-toothed; cauline leaves similar but sessile or nearly so; inflorescence cymose, the globose pedunculate heads 8–15 mm. long; bracts linear-lanceolate, 1–3 cm. long, callous-margined, usually entire, conspicuously scarious-margined at base, greatly surpassing the heads; bractlets similar, the scarious basal margin embracing the fruit; sepals lanceolate, 3–4 mm. long, mucronate; styles slightly exceeding the sepals; fruit ovoid, 3 mm. long, densely covered with appressed, subequal white scales.

Heavy soils in depressions, Upper Sonoran Zone; western foothills of the central Sierra Nevada, California. Type locality: Duffield Canyon, Soulsbyville, California. June–Aug.

4. *Eryngium petiolatum* Hook. Oregon Eryngo or Coyote-thistle. Fig. 3634.

Eryngium petiolatum Hook. Fl. Bor. Amer. 1: 259. 1832.

Eryngium petiolatum var. *juncifolium* A. Gray, Proc. Amer. Acad. 8: 385. 1872.

Plants caulescent, slender, erect or ascending, 2–5 dm. high, branching above. Lower leaves reduced to elongate, septate petioles 1–4 dm. long, with or without small lanceolate to ovate spinulose-serrate blades; cauline leaves similar, reduced, sessile or short-petiolate; inflorescence cymose, the numerous small heads short-pedunculate, globose, 5–8 mm. in diameter; bracts and bractlets rigid, subulate, obscurely callous-margined and ciliate-spinose, much longer than the heads; sepals lanceolate, 3 mm. long, usually entire; styles a little shorter than the sepals; fruit ovoid-oblong, 2 mm. long, densely covered with depressed, flat, white, subequal scales.

Wet ground, Transition Zones; Falcon Valley, Washington, and Willamette and Hood River Valleys to southern Oregon. Type locality: "moist soils on the plains of the Multnomak [Willamette] River," Oregon. July–August.

5. *Eryngium alismaefolium* Greene. Alisma-leaved Eryngo or Coyote-thistle. Fig. 3635.

Eryngium petiolatum var. *minimum* Coul. & Rose, Rev. N. Amer. Umbell. 98. 1888.

Eryngium articulatum var. *microcephalum* Coul. & Rose, op. cit. 99.

Eryngium alismaefolium Greene, Erythea 3: 64. 1895.

Plants low, the numerous stems clustered at the base, diffusely branched, 0.5–3 dm. high. Basal leaves lanceolate to ovate, often 3–15 cm. long and exceeding the stems, the earlier leaves consisting of terete, septate bladeless petioles, the later flat, spinose and developing a lanceolate to ovate, spinose-serrate, incised or pinnatifid blade; cauline leaves similar, much-reduced; inflorescence cymose, the small heads numerous, short-pedunculate, globose, 5–10 mm. in diameter; bracts few, linear-lanceolate to subulate, 6–16 mm. long, often spinose-ciliate, exceeding the heads; bractlets spinose to entire, with broad scarious margins, exceeding the fruit; sepals ovate-lanceolate, 1–3 mm. long, scarious-margined; styles equaling or slightly longer than the sepals; fruit ovoid, about 2 mm. long, densely covered with narrow, flat, white, subequal scales.

Mountain meadows, Transition Zones; south-central Oregon to northeastern California and northern Nevada. Type locality: Egg Lake, Modoc County, California. Aug.

6. *Eryngium racemosum* Jepson. Delta Eryngo or Coyote-thistle. Fig. 3636.

Eryngium racemosum Jepson, Fl. Calif. 2: 659. 1936.

Stems slender, decumbent or prostrate, 2 or 3 from the base, 1–3 dm. long. Basal leaves lanceolate, 2–5 cm. long, nearly entire to spinulose-serrate; petioles slender, elongate, septate, 1–4 dm. long, exceeding the blades; inflorescence falsely racemose, the small, numerous heads short-pedunculate, 4–8 mm. long; bracts about 8, linear, 8–10 mm. long, spinulose at the base, exceeding the heads; the bractlets scarious-margined at the base, not spinulose, longer than the fruit; sepals ovate, entire, 1–1.5 mm. long, scarious-margined; styles slightly exceeding the sepals; fruit ovoid, 1.5 mm. long, densely covered with short, appressed, white or tawny, subequal scales.

Low flats and river bottoms, Upper Sonoran Zone; San Joaquin Delta, California. Type locality: San Joaquin City, California. Aug.–Oct.

7. *Eryngium aristulatum* Jepson. Jepson's Eryngo or Coyote-thistle. Fig. 3637.

Eryngium aristulatum Jepson, Erythea 1: 62. 1893.

Eryngium elongatum Coul. & Rose, Contr. U.S. Nat. Herb. 7: 53. 1900. Not Pohl, 1879.

Eryngium Jepsonii Coul. & Rose, op. cit. 54.

Eryngium oblanceolatum Coul. & Rose, op. cit. 56.

Eryngium californicum Jepson, Fl. W. Mid. Calif. 343. 1901.

Eryngium laxibracteum Mathias, Brittonia 2: 245. 1936.

Plants stout or slender, 1–8 dm. high, the stems with erect or prostrate branches; basal leaves oblanceolate to obovate, 3.5–25 cm. long, spinulose-serrate to incised or lobed, or blades obsolete; petioles elongate, septate, 5–25 cm. long; inflorescence cymose, the numerous heads pedunculate, globose, 5–12 mm. in diameter, the upper often much smaller than the lower; bracts spreading, linear or linear-lanceolate, 0.5–2.5 cm. long, varying with the size of the heads which they equal or greatly exceed, spinose and somewhat scarious-winged at base; bractlets spinose or entire, scarious-lobed at base and enfolding the fruit, often spinose in the sinuses, equaling or exceeding the fruit; sepals lanceolate, 1.5–3.5 mm. long, usually entire; styles usually exceeding the sepals; fruit ovoid, 1.5–2.5 mm. long, densely covered with narrow, appressed scales, those of the upper portion greatly exceeding those at the base.

Vernal pools and salt marshes, Transition and Upper Sonoran Zones; Coast Ranges and Sierra Nevada foothills of northern California. Type locality: "in the dry bed of a winter lake, mountains south of Uncle Sam Mountain," Lake County. June–Sept.

Eryngium aristulatum var. *Parishii* (Coul. & Rose) Math. & Const. Amer. Midl. Nat. 25: 386. 1941. (*Eryngium Parishii* Coul. & Rose, Contr. U.S. Nat. Herb. 7: 57. 1900.) Similar but sepals ovate, usually puberulent, and the scales of the fruit subequal. San Diego County, California, to northern Lower California. Type locality: Oceanside, San Diego County.

8. *Eryngium Vaseyi* Coul. & Rose. Vasey's Eryngo or Coyote-thistle.

Fig. 3638.

Eryngium Vaseyi Coul. & Rose, Bot. Gaz. 13: 142. 1888.

Plants rather stout, the erect or ascending stems 1.5–4 dm. high, diffusely branched. Basal leaves oblong-lanceolate to ovate, 9–25 cm. long, deeply pinnatifid, with unequal, spinulose-lobed or pinnatifid segments; petioles very short; inflorescence corymbose, the numerous heads subglobose, 5–10 mm. long; bracts spreading, linear-subulate, 5–15 mm. long; densely spinose with 1–5 pairs of lateral, but no dorsal spines; bractlets similar, spinose or rarely entire, scarious-winged at base, enfolding and exceeding the fruit; sepals lanceolate to ovate, 1–3 mm. long, scarious-margined, entire to somewhat spinose; styles shorter or longer than the sepals; fruit ovoid, 2–3 mm. long, densely covered with appressed, narrow, subequal white scales.

Shallow vernal pools, Upper Sonoran Zone; upper Salinas and San Joaquin Valleys, California. Type locality: San Antonio River, Monterey County, California. June–Sept.

Eryngium Vaseyi var. *castrénse* (Jepson) Hoover ex Math. & Const. Amer. Midl. Nat. 25: 387. 1941. (*Eryngium castrénse* Jepson, Madroño 1: 108. 1923; *E. globosum* var. *mcadumii* Jepson, loc. cit.) Often stouter; heads subglobose to ovoid, 6–15 mm. long; bracts densely beset with dorsal as well as lateral spines, greatly exceeding the heads; bractlets densely spiny and usually with some dorsal spines, greatly exceeding the fruit; sepals usually spinose. Great Valley of California, especially on the northeastern side. Type locality: Chinese Camp, Tuolumne County.

Eryngium Vaseyi var. *globosum* (Jepson) Hoover ex Math. & Const., loc. cit. (*Eryngium globosum* Jepson, Madroño 1: 108. 1923; *E. spinosepalum* Mathias, Brittonia 2: 245. 1936.) Often stouter; heads globose



3633. *Eryngium pinnatisectum*
3634. *Eryngium petiolatum*

3635. *Eryngium alismaefolium*
3636. *Eryngium racemosum*

3637. *Eryngium aristulatum*
3638. *Eryngium Vaseyi*

to ovoid, 8–18 mm. long; bracts spreading to slightly reflexed, 1–3 cm. long, pinnately spinose and often with some dorsal spines, greatly exceeding the heads; bractlets pinnately spinose and often with some dorsal spines, the basal wing spinose; sepals, or some of them, pinnatifid with 3–8 spiny teeth. Upper San Joaquin Valley, California. Type locality: Exeter, Tulare County.

Family 110. CORNACEAE.

DOGWOOD FAMILY.

Trees, shrubs or suffrutescent plants with usually entire opposite, verticillate or rarely alternate leaves. Flowers perfect or polygamo-dioecious, cymose, capitate or rarely solitary, with or without petaloid bracts. Hypanthium adnate to the ovary. Sepals 4 or 5, minute. Petals 4–5, rarely more, inserted at the base of the epigynous disk. Stamens as many as petals or more numerous. Ovary inferior, 1–2-celled, rarely more; style 1; stigma terminal; ovules 1 in each cell, pendulous, anatropous. Fruit a drupe; stone 1–2-celled; endosperm present.

A family of about 16 genera and 80 species.

1. CÔRNUS L. Sp. Pl. 117. 1753.

Trees, shrubs or suffrutescent plants, with opposite, verticillate or rarely alternate leaves, and small flowers in cymes or heads, the latter subtended by showy petaloid bracts. Sepals 4, minute. Petals 4, valvate. Stamens 4. Ovary 2-celled; stigma terminal, truncate or capitate. Drupe ovoid or globose with a 2-celled and 2-seeded stone. [Name Latin, meaning horn, in reference to the hard wood.]

A genus of about 25 species, native of the north temperate regions; also Mexico and Peru. Type species, *Cornus Mas* L.

Flowers cymose or umbellate, without involucre bracts, or these small and caducous.

Flowers cymose, naked.

Leaves thinly appressed-puberulent, or glabrate.

Branches of the inflorescence glabrous; leaves bright green beneath; petals strap-shaped; drupe white. 1. *C. glabrata*.

Branches of the inflorescence appressed-puberulent; leaves pale green beneath; petals ovate-oblong; drupe bluish. 2. *C. stolonifera*.

Leaves more or less tomentose beneath with spreading hairs; drupe white. 3. *C. californica*.

Flowers in few-flowered axillary umbels, subtended by 4 caducous bracts. 4. *C. scssilis*.

Flowers in a head, subtended by large persistent white bracts.

Tree or arborescent shrub.

5. *C. Nuttallii*.

Low herbaceous plants, with a creeping rootstock.

6. *C. canadensis*.

1. *Cornus glabrata* Benth. Smooth or Brown Dogwood. Fig. 3639.

Cornus glabrata Benth. Bot. Sulph. 18. 1844.

Svida glabrata Heller, Cat. N. Amer. Pl. ed. 3. 273. 1914.

Shrub 1.5–6 m. high, branches bright reddish purple, young twigs nearly or quite glabrous. Leaves lanceolate to ovate or oblong-ovate, 3–6 cm. long, green, sparingly appressed-puberulent on both surfaces, cuneate at base and acute or short-acuminate at apex; cyme 2–4 cm. broad, the branches reddish brown, glabrous or sparingly appressed-puberulent; petals strap-shaped, white, 4–5 mm. long; drupe globose, white; stone globose or slightly depressed, 4 mm. broad, obscurely grooved.

Moist soils, banks and bottom land, Transition and Upper Sonoran Zones; Klamath, Jackson and Josephine Counties, Oregon, south through the Coast Ranges and Sierra Nevada to San Diego County, California. Type locality: San Francisco, California. May–June.

2. *Cornus stolonifera* Michx. American Dogwood. Fig. 3640.

Cornus stolonifera Michx. Fl. Bor. Amer. 1: 92. 1803.

Svida stolonifera Rydb. Bull. Torrey Club 31: 572. 1904.

Cornus alba subsp. *stolonifera* Wangerin, Pflanzenreich 4²⁹: 53. 1910.

Cornus instolonensis A. Nels. Bot. Gaz. 53: 224. 1912.

Cornus californica var. *nevadensis* Jepson, Man. Fl. Pl. Calif. 733. 1925.

Cornus sericea subsp. *stolonifera* Fosberg, Bull. Torrey Club 69: 587. 1942.

Shrub 2–5 m. high, bark of old stems grayish brown, young twigs olive-green becoming reddish purple, glabrous or very sparingly pubescent. Leaves ovate to ovate-lanceolate, 3–10 cm. long, acute or short-acuminate at apex, obtuse at base, sparingly appressed-puberulent beneath, and sometimes above on the midvein, or sometimes glabrous on both sides; cyme flat-topped, 2.5–5 cm. broad, appressed-puberulent; petals ovate-oblong, white; drupe bluish, globose, 6–8 mm. in diameter; stone subglobose, 4–5 mm. in diameter, smooth.

Moist soils, Boreal Zones; Alaska to Newfoundland south through the Pacific States to the Sierra Nevada, California, and to Nebraska and Virginia. Type locality: Canada and New England. May–July. Red Osier.

3. *Cornus californica* C. A. Mey. Western Red Dogwood. Fig. 3641.

Cornus sericea var. *occidentalis* Torr. & Gray, Fl. N. Amer. 1: 652. 1840.

Cornus californica C. A. Mey. Bull. Acad. St. Pétersb. Phys.-Math. 3: 372. 1845.

Cornus pubescens Nutt. N. Amer. Sylva 3: 54. 1849.

Cornus Torreyi S. Wats. Proc. Amer. Acad. 11: 145. 1876.

Cornus occidentalis Coville, Contr. U.S. Nat. Herb. 4: 117. 1893.

Svida californica Abrams, Bull. N.Y. Bot. Gard. 6: 429. 1910.

Cornus stolonifera var. *californica* McMinn, Ill. Man. Calif. Shrubs 377. 1939.

Shrub, with smooth purplish branches, 2-5 m. high. Leaves ovate to oblong-elliptic, acute or somewhat acuminate at apex, shortly cuneate at base, 5-10 cm. long, pale beneath and more or less tomentose-pubescent with loose silky hairs especially on the veins; cyme spreading, 3-5 cm. broad; drupe grayish white, subglobose; stone 5 mm. broad, slightly compressed, furrowed on the edges.

Moist ground, Transition and Upper Sonoran Zones; British Columbia and Idaho to southern California. Type locality: near San Francisco and Fort Ross, California. May-July. Creek Dogwood.

4. *Cornus sessilis* Torr. Miners Dogwood. Fig. 3642.

Cornus sessilis Torr. ex Durand, Journ. Acad. Phila. II. 3: 89. 1855.

Svida sessilis Heller, Cat. N. Amer. Pl. ed. 3. 273. 1914.

Shrub or small tree 1.5-4 m. high, with glabrous pale branches becoming red-brown in age. Leaves obovate-elliptic, acute or abruptly short-acuminate at apex, cuneate at base, 5-8 cm. long, pale beneath and sparingly appressed-pubescent; flowers in few-flowered axillary umbels, subtended by 4 small caducous bracts; petals yellowish; fruiting pedicels 10-12 mm. long, appressed-pubescent; drupes oblong-ellipsoid, pale greenish yellow when immature, finally purple-black and shining when ripe; stone 10-12 mm. long.

Along streams, Arid Transition and Upper Sonoran Zones; Humboldt and Siskiyou Counties to Calaveras County, California. Type locality: Deer Creek, near Nevada City, California. March-April. Blackfruit Dogwood.

5. *Cornus Nuttallii* Audubon. Nuttall's or Mountain Dogwood. Fig. 3643.

Cornus Nuttallii Audubon ex Torr. & Gray, Fl. N. Amer. 1: 652. 1840.

Cynoxylon Nuttallii Shafer in Britton, N. Amer. Trees 746. 1908.

Tree 4-25 m. high, with an obconic or rounded crown, with brownish bark, young twigs greenish, glabrous or appressed-pubescent, soon turning red-brown. Leaves ovate-elliptic to obovate-elliptic, often abruptly acute at apex, 5-10 cm. long, bright green and slightly strigose above, pale and tomentose beneath; flowers mostly appearing before the leaves; peduncles stout, 2-3 cm. long; involucre bracts white sometimes tinged with purple, oblong to obovate, 3-5 cm. long, subtending the many-flowered heads; petals 4, strap-shaped, spreading, greenish yellow; fruit a spherical head of many bright red drupes, 10-12 mm. long.

Open forest especially north slopes, Transition Zones; British Columbia and northern Idaho southward west of the Cascade Mountains to southern California. Type locality: Oregon. April-July.

6. *Cornus canadensis* L. Dwarf Cornel or Bunch-berry. Fig. 3644.

Cornus canadensis L. Sp. Pl. 117. 1753.

Cornus unalaschkensis Ledeb. Fl. Ross. 2: 378. 1844-46.

Chamaepericlymenum canadense Aschers. & Grabn. Fl. Nordd. Flachl. 539. 1898.

Corenella canadensis Rydb. Bull. Torrey Club 33: 147. 1906.

Chamaepericlymenum unalaschkense Rydb. Fl. Rocky Mts. 635, 1065. 1917.

Rootstock nearly horizontal; flowering stems herbaceous, woody only at the base, 7-25 cm. high. Leaves verticillate at the summit of the stem, or sometimes with 1 or 2 pairs of opposite ones below, sessile, 2.5-7 cm. long, oval to obovate, acute at each end, glabrous or strigose; peduncles slender, 2-4 cm. long; involucre bracts 4, ovate, 8-18 mm. long, white, subtending the solitary head; petals greenish, ovate, one of them with a subulate appendage; fruit globose, bright red, 6 mm. in diameter.

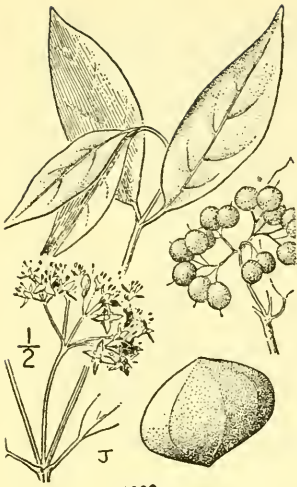
Moist woods or swamps, Humid Transition and Canadian Zones; Alaska to Mendocino County, California, east to Newfoundland, New Mexico, Minnesota and New Jersey. Type locality: Canada. May-July.

Family 111. GARRYACEAE.*

SILK-TASSEL FAMILY.

Evergreen shrubs or small trees with branchlets often somewhat quadrangular and opposite simple entire leaves on short petioles. Flowers dioecious and apetalous,

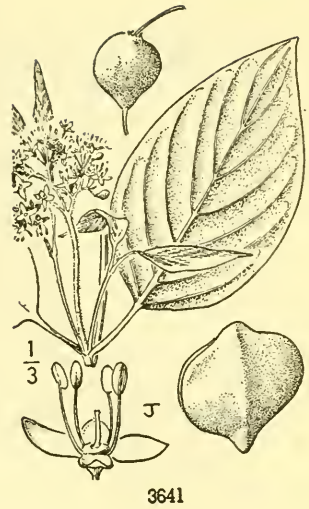
* Text contributed by Rimo Bacigalupi.



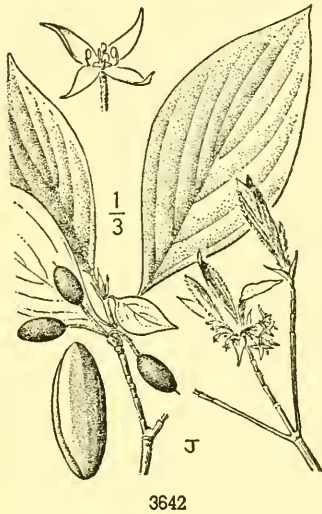
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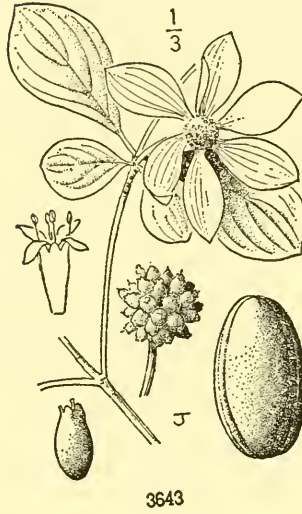
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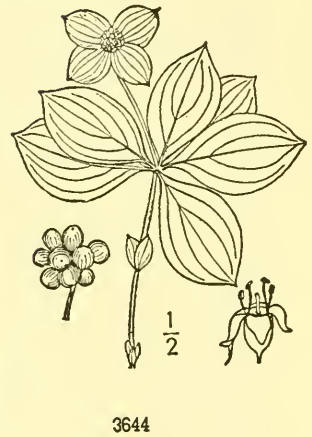
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3639. *Cornus glabrata*
 3640. *Cornus stolonifera*
 3641. *Cornus californica*

3642. *Cornus sessilis*
 3643. *Cornus Nuttallii*
 3644. *Cornus canadensis*

3645. *Garrya elliptica*
 3646. *Garrya Veatchii*
 3647. *Garrya Congdonii*

borne in pendulous aments, the pistillate solitary, the staminate in threes in the axils of the decussate and connate bracts. Sepals 4 in the staminate flower, linear to oblong-lanceolate and valvate, in the pistillate flower obsolete or 2, small and bract-like, situated near the top of the ovary. Stamens 4, alternate with the sepals. Ovary inferior, 1-celled; ovules 2, pendulous; styles 2, persistent, stigmatic on the inner side. Fruit capsular, the bitter pulp surrounding the 1-2 seeds, drying blackish, enclosed in and soon free from the brittle epicarp. Seeds with a horny endosperm and relatively small embryo.

One genus of about 14 species, natives of the western United States and Mexico.

1. *GARRYA* Dougl. Bot. Reg. 20: pl. 1686. 1834.

Characters of the family. A very distinct group of plants suggesting the *Cornaceae* in fruit and seed, but considered by some botanists as a distinct order and placed near the *Salicaceae* and *Fagaceae*. [Named in honor of Nicholas Garry of the Hudson Bay Company, friend and benefactor of David Douglas.]

A genus of 15 species, natives of western United States and Mexico. Type species, *Garrya elliptica* Dougl.

Lower surface of the leaves densely tomentose with curled or wavy hairs.

Tomentum of under surface of leaves of very short curled hairs forming a dense felt.

Leaves oval or broadly elliptic, rounded or obtuse at apex, the margins strongly undulate.

1. *G. elliptica*.

Leaves ovate or lanceolate, acuminate, plane or rarely slightly undulate.

2. *G. Veatchii*.

Tomentum of under surface of leaves of long wavy hairs, these mostly ascending.

3. *G. Congdonii*.

Lower surface of the leaves nearly glabrous or if pubescent, the hairs straight and upwardly appressed.

Mature leaves glabrous beneath or only sparingly appressed-pubescent.

4. *G. Fremontii*.

Mature leaves densely silky-pubescent beneath with short closely appressed hairs.

Leaves dull and gray-green above; fruit densely silky-pubescent.

5. *G. flavescens pallida*.

Leaves glossy and bright or olive-green above; fruit glabrate.

6. *G. busifolia*.

1. *Garrya elliptica* Dougl. Coast Silk-tassel. Fig. 3645.

Garrya elliptica Dougl. Bot. Reg. 20: pl. 1686. 1834.

Shrub or small tree up to 7 m. high, the young branchlets densely short-villous, becoming brown or blackish. Leaves usually elliptic but ranging from oval to ovate-lanceolate, 6-8 cm. or rarely 12 cm. long, coriaceous, the margins usually strongly undulate, glabrate and more or less shining above, densely clothed beneath with a dense tomentum of short, curly and intertwined hairs; staminate aments unbranched, fascicled at the ends of the branchlets, usually 8-15 cm. long, their bracts densely silky-villous; sepals densely pilose on the back, often connate at the tips; fruiting aments compact; fruit often concealing the bracts, globose, 6-11 mm. in diameter, densely tomentose or the tomentum in age more or less deciduous.

Thickets or chaparral slopes, mainly Humid Transition Zone; coastal region and Outer Coast Ranges from central Oregon to northern San Luis Obispo County, California. Type locality: "Northern California." Actually, on the Umpqua River near Scottsburg, Oregon, according to Douglas' journal. Jan.-March.

2. *Garrya Veatchii* Kell. Southern Silk-tassel. Fig. 3646.

Garrya Veatchii Kell. Proc. Calif. Acad. 5: 40. 1873.

Garrya flavescens var. *Palmeri* S. Wats. Bot. Calif. 1: 276. 1876.

Garrya Veatchii var. *Palmeri* Eastw. Bot. Gaz. 36: 458. 1903.

Garrya Veatchii var. *undulata* Eastw. loc. cit.

Shrub 1-2.5 m. high, young branchlets densely hoary-tomentose, at length glabrate and reddish brown. Leaves lanceolate to ovate or ovate-elliptic, 2.5-6.5 cm. long, coriaceous and plane, rarely somewhat undulate, the upper surface pale green without a sheen, sparsely tomentulose, the lower surface hoary with dense felt-like tomentum; staminate aments solitary or fascicled, unbranched, 3-7 cm. long; bracts floccose, the lower sometimes with foliaceous tips; young ovary densely woolly; fruiting ament compact, 2.5-5 cm. long; fruit becoming less woolly but not glabrate, 7-8 mm. in diameter, buff to purple-brown.

Chaparral slopes, Upper Sonoran Zone; Santa Barbara County, California, to central Lower California. Type locality: Cedros Island, Lower California. Feb.-April.

3. *Garrya Congdonii* Eastw. Congdon's Silk-tassel. Fig. 3647.

Garrya Congdonii Eastw. Bot. Gaz. 36: 459. 1903.

Garrya flavescens var. *venosa* Jepson, Man. Fl. Pl. Calif. 732. 1925.

Shrub 1.5-3 m. high, young branchlets silky-pubescent with ascending wavy hairs, glabrate and reddish brown in age. Leaves commonly ovate-lanceolate, varying to lanceolate or elliptic, 3.5-7 cm. long, glossy yellowish green above, and thinly puberulent above with appressed crinkled hairs, beneath densely clothed with mostly upwardly appressed rather long gently wavy hairs which slightly intertwine; staminate aments 3-7 in a cluster, unbranched, 3-8 cm. long; bracts shortly acuminate with an abrupt recurved tip; pistillate aments 2-3 cm. long; ovary

densely covered with an appressed-pubescent; fruit broadly ovoid or spherical, densely pubescent or glabrate toward the base, often buff with a dark purplish tinge, 5–8 mm. in diameter.

Chaparral ridges and canyons, Upper Sonoran Zone; Inner Coast Ranges from Tehama County to San Benito County and in the foothills of the Sierra Nevada, California. Type locality: Coulterville Road, near Coulterville, Mariposa County. March–April.

4. *Garrya Fremontii* Torr. Fremont's Silk-tassel. Fig. 3648.

Garrya Fremontii Torr. Pacif. R. Rep. 4: 136. 1857.

Garrya rigida Eastw. Bot. Gaz. 36: 461. 1903.

Garrya Fremontii var. *laxa* Eastw. loc. cit.

Shrub 1.5–5 m. high, the young twigs appressed silky-pubescent, soon glabrate and reddish brown. Leaves oblong-ovate to suborbicular, usually tapering at each end, 2–4.5 cm. long, coriaceous, strongly reticulate-veined, bright green above, paler or yellowish and thinly appressed-pubescent or glabrate beneath; staminate aments solitary or clustered, unbranched, very lax; bracts acuminate, densely pilose to glabrate and ciliate; fruiting aments compact, with almost foliaceous bracts, 4–6 cm. long; fruit globose, glabrous or nearly so, bluish black or buff tinged with purple, 5–6 mm. in diameter.

Chaparral slopes, often extending into woodland, Upper Sonoran and Arid Transition Zones; southern Washington to Tulare and Monterey Counties, California. Also sparingly in the San Jacinto Mountains of southern California. Type locality: "On a small head water of Cow Creek," Shasta County, California. Feb.–April. Bear Brush.

5. *Garrya flavescens* var. *pallida* (Eastw.) Bacigalupi. Ashy Silk-tassel. Fig. 3649.

Garrya pallida Eastw. Proc. Calif. Acad. III. Bot. 2: 287. 1902.

Garrya flavescens var. *pallida* Bacigalupi ex Ewan, Bull. Torrey Club 64: 519. 1937.

Shrub 1.5–2.5 m. high, young seasonal branchlets cinereous with a short silky appressed pubescence, glabrate and brownish in age. Leaves oblong-elliptic to oval, 3–6 cm. long, stiffly coriaceous, gray-green, sparsely appressed-pubescent above, densely so and silky beneath; staminate aments unbranched, 3–4 cm. long; bracts 4–7 mm. long, broadly ovate, their tips often produced into foliar recurved projections; fruiting aments compact, their bracts densely silky; berry broadly ovoid, 6–8 mm. broad, densely appressed silky-pubescent.

Chaparral slopes, Arid Transition and Upper Sonoran Zones; southern Sierra Nevada (Fresno County) and Coast Ranges of Santa Barbara south to the Cuyamaca Mountains, San Diego County, California. Specimens from the Providence and Clark Mountains of the Mojave Desert approach typical *G. flavescens* S. Wats. of Utah and Arizona, and specimens of the southern Santa Lucia Mountains approach *G. Fremontii*. Type locality: King's River Canyon, South Fork of King's River, Fresno County. Feb.–April.

6. *Garrya buxifolia* A. Gray. Dwarf Silk-tassel. Fig. 3650.

Garrya buxifolia A. Gray, Proc. Amer. Acad. 7: 349. 1868.

Garrya flavescens var. *buxifolia* Jepson, Man. Fl. Calif. 732. 1925.

Low shrub 0.5–1.5 m. high, the young branchlets moderately appressed-pilose, glabrate and reddish brown in age. Leaves oblong-elliptic to suborbicular, 1–4 cm. long, coriaceous, glabrous and bright or olive-green and glossy above, silvery-gray beneath with a dense appressed pubescence; petioles short, appressed-pubescent; staminate aments in clusters of 2–4, unbranched, 5–7 cm. long; bracts connate, acuminate, 4–7 mm. long; fruiting aments 3–9 cm. long, compact; bracts uniformly appressed-pilose; fruit 4–6 mm. in diameter, very short-pedicelled, glabrate, bluish black, the pair of sepals usually evident.

Rocky slopes, Transition and Canadian Zones; most abundant in the Siskiyou Mountains but ranging from Josephine and Curry Counties, Oregon, to northern Mendocino County, California. Type locality: Red Mountain, Mendocino County, California. March.

Series 2. *Sympétalae*.

Petals usually more or less united below, forming a corolla-tube and a lobed limb. Stamens inserted on the corolla-tube except in some of the *Pyrolaceae* and *Monotropaceae*.

Family 112. PYROLACEAE.

WINTERGREEN FAMILY.

Perennials with slender, creeping, branched, scaly rootstocks. Stems low, more or less suffrutescent. Leaves evergreen, alternate, often crowded into false verticils, coriaceous, mostly serrate or crenate, exstipulate, petioled. Flowers racemose, corymbose or solitary, bracteate, perfect, regular. Sepals 4–5, more or less united at the base. Corolla of 5 or rarely 4 distinct or slightly united petals. Stamens 10, hypogynous; filaments more or less dilated at the base; anthers inverted in anthesis, opening by round or oblong pores at the ends of small tubes. Ovary superior, usually with a disk, 5-celled, or rarely 4-celled, sometimes incompletely 10-celled, sub-

globose and obtusely 5-angled. Ovules anatropous, numerous on axillary placentae. Styles wholly united or sometimes distinct, short or slender, often declined. Stigmas 5-lobed, with short stout lobes. Fruit a loculicidally dehiscent capsule, depressed-globose, 5-angled. Seeds minute, numerous, with a loose testa and a large aril.

A family of 5 genera and about 25 species, widely distributed in the extratropical regions of the northern hemisphere and with the center of distribution in North America.

Flowers racemose; petals concave and more or less converging; capsules dehiscent from below upwards.

1. *Pyrola*.

Flowers solitary or corymbose; petals spreading; stigmas peltate; capsules dehiscent from above downwards.

Flowers solitary; subacaulescent herbs; leaves suborbicular.

2. *Moneses*.

Flowers corymbose or umbellate; suffrutescent plants; leaves ovate to lanceolate.

3. *Chimaphila*.

1. *PÝROLA* [Tourn.] L. Sp. Pl. 396. 1753.

Perennial glabrous herbs with creeping rootstocks, the stems above ground, short. Leaves clustered at the bases of the stems or sometimes wanting, evergreen, rather thick, veiny, the veins ending in the sinuses of the teeth or protruding as a mucro. Scapes usually with 1 to several scales similar to the floral bracts. Flowers in a single terminal raceme, short-pedicelled and mostly nodding. Sepals 5, slightly united at base. Corolla campanulate or hemispheric; petals 5, distinct, concave, white to greenish or purple. Stamens 10; filaments more or less dilated at base, incurved. Pistils of 5 united carpels; style deflexed at base, then curved upwards and usually thickened towards the apex, there dilated into a collar with 5 erect papilla-like stigmas within, or style straight without a collar and capped by a peltate stigma with 5 spreading papillae borne on the margin. Fruit depressed-globose, 5-valved, dehiscent from the base upwards, the valves connected by arachnoid threads. [Name Latin, diminutive of *Pyrus*, the pear, from the similarity of the leaves.]

A genus of about 15 species, natives of the northern hemisphere, mainly North America. Type species, *Pyrola rotundifolia* L.

Style strongly deflexed at base then turned upwards, with a thickened truncate end forming a collar with 5 erect or connivent papillae within; filaments declined and curved upwards, bearing the anthers above the style.

Green leaves normally developed.

Petals purple or pink; sepals much longer than broad.

Leaves distinctly mucronulate-denticulate by the prolongation of the veins at the margin, acute at apex, firm, shining on the upper surface.

1. *P. bracteata*.

Leaves not denticulate, rounded at apex, thin, dull on the upper surface.

2. *P. asarifolia incarnata*.

Petals white or greenish white, rarely pinkish; calyx-lobes about as long as broad (varying from a little shorter to a little longer).

Leaves suborbicular, rounded at apex, the margins not chartaceous.

3. *P. chlorantha*.

Leaves ovate to oval, acutish at apex, or spatulate and obtuse.

Leaves usually broadest below the middle, ovate to oval, distinctly mottled on the upper surface.

4. *P. picta*.

Leaves obovate to oblanceolate or spatulate, not mottled.

5. *P. dentata*.

Green leaves wanting, or 1 or 2 and much-reduced.

6. *P. aphylla*.

Style straight, without a collar; stigma peltate, broader than the style, the papillae marginal and spreading; stamens all connivent around the pistil.

Disk none; petals without nectaries; styles short, shorter than the capsule; leaves crenulate.

7. *P. minor*.

Disk present, 10-lobed; petals with tubercle-like nectaries; style elongate, longer than the mature capsule; leaves serrulate.

8. *P. secunda*.

1. *Pyrola bracteata* Hook. Large or Oregon Wintergreen. Fig. 3651.

Pyrola bracteata Hook. Fl. Bor. Amer. 2: 47. 1834.

Pyrola rotundifolia var. *bracteata* A. Gray, Bot. Calif. 1: 460. 1876.

Pyrola asarifolia var. *bracteata* Jepson, Fl. Calif. 3: 59. 1939.

Perennial, the stem above ground 5 cm. or less high; scape 2-4 dm. high, with 1 or 2 scarios bracts below the inflorescence. Leaves all basal with petioles about as long as the blades, oval to broadly ovate or suborbicular, 3-8 cm. long, acute or acutish or rarely rounded at apex, rounded to subcordate at base or rarely slightly decurrent on the petiole, coriaceous, dark green and shining above, paler and brownish or reddish beneath, distinctly mucronulate-denticulate, with the teeth formed by the excurrent veins; floral bracts conspicuous, 1-1.5 cm. long, broadly lanceolate and acuminate, reddish; sepals triangular-lanceolate, 4-5 mm. long; petals ovate to obovate, 6-8 mm. long, rose-purple or dull red; anthers reddish or yellow in age; style strongly declined, 6-8 mm. long in flower, 8-9 mm. in fruit, slightly thickened below the collar; capsule 7-8 mm. broad.

Wet places in open coniferous forests, Humid Transition Zone; widely distributed in the Coast Ranges and western slopes of the Cascade Mountains from southern British Columbia to Mendocino County, California; and in scattering localities in the mountains of eastern Washington and Oregon, eastward to northern Idaho and western Montana. Type locality: "N.W. Coast." Collected by Scouler. May-July.



3648



3649



3650



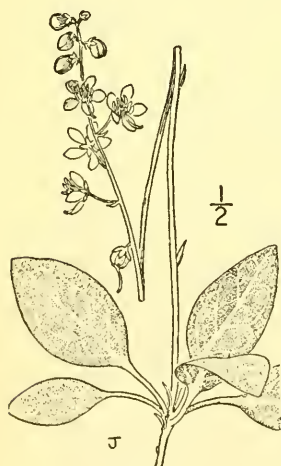
3651



3652



3653



3654



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3656

3648. *Garrya Fremontii*
 3649. *Garrya flavescens*
 3650. *Garrya buxifolia*

3651. *Pyrola bracteata*
 3652. *Pyrola asarifolia*
 3653. *Pyrola chlorantha*

3654. *Pyrola picta*
 3655. *Pyrola dentata*
 3656. *Pyrola aphylla*

2. *Pyrola asarifolia* var. *incarnata* (DC.) Fernald. Bog Wintergreen. Fig. 3652.

Pyrola rotundifolia var. *incarnata* DC. Prod. 7: 773. 1839.

Pyrola uliginosa Torr. & Gray ex Torr. Fl. N.Y. 1: 453. pl. 69. 1843.

Pyrola elata Nutt. Trans. Amer. Phil. Soc. II. 8: 270. 1843.

Pyrola asarifolia var. *incarnata* Fernald, Rhodora 6: 178. 1904.

Pyrola asarifolia var. *uliginosa* Farwell, Rep. Mich. Acad. 19: 259. 1917.

Perennial, with long creeping branched rootstock; stem above ground very short. Leaves with petiole 2–10 cm. long, the blades orbicular, rounded at apex, acutish at base or at least decurrent on the petiole, 3–7 cm. long, obscurely crenulate, the veins not excurrent, dull on the upper surface; scape with its 5–20-flowered raceme, 2–5 dm. high; bracts lanceolate, about equaling the pedicels, pinkish; sepals ovate to ovate-lanceolate, widest just above the base, 2.5–3 mm. long, acute; petals reddish purple to pink, oval, about 6 mm. long; anthers pinkish, the tubes curved; style 7–8 mm. long in flower, about 1 mm. longer in fruit; stigmas at maturity longer than the collar; capsule depressed-globose, about 8 mm. wide.

Bogs and wet meadows, Transition and Canadian Zones; in the Pacific States ranging from San Juan Island and the Cascade Mountains, Washington, to the Cascade and Blue Mountains, Oregon, and to the southern Sierra Nevada and San Bernardino Mountains, California. In general, ranging from Alaska and the Pacific States to the Atlantic Coast; also in Asia. Type locality: "in Dahuria." July–Sept.

3. *Pyrola chlorantha* Sw. Greenish-flowered Wintergreen. Fig. 3653.

Pyrola chlorantha Sw. Svensk. Vet. Akad. Handl. II. 31: 190. pl. 5. 1810.

Perennial with a long slender rootstock; stem above ground very short. Leaves usually several; petiole 2–5 cm. long, usually longer than the blades, these orbicular to broadly oval or rarely broadly ovate, rounded at base, rounded to obtuse at apex, 1–3 cm. long, entire to shallowly crenate, the veins slightly excurrent forming minute mucrones, dark dull green above, pale beneath, coriaceous; pedicels 3–6 mm. long; calyx-lobes ovate or ovate-triangular, mostly obtuse, 2 mm. long; petals greenish white, converging, broadly oblong, obtuse; 5–6 mm. long, stamens and style declined-ascending; anther-sacs short-beaked; capsule depressed-globose; fruiting style 7–8 mm. long.

Humus soils in coniferous forests, Transition and Canadian Zones; British Columbia southward in the Pacific States to western and eastern Washington and to the Blue and Wallowa Mountains, northeastern Oregon; ranging across the continent to Labrador, Virginia, Nebraska and Arizona. Type locality: near Stockholm, Sweden. June–Aug.

4. *Pyrola picta* Smith. White-veined Wintergreen or Shin-leaf. Fig. 3654.

Pyrola picta Smith in Rees, Cycl. 29: no. 8. 1814.

Pyrola sparsifolia Suksd. Alleg. Bot. Zeit. 12: 26. 1906.

Perennial from a branched rootstock, stems above ground up to 5 cm. high. Leaves coriaceous, mottled with white along the principal veins on the upper surface, ovate-lanceolate to broadly ovate, acute or acutish, or some of the smaller ones rounded at the apex, obtuse at base or rarely acute and more or less decurrent, 2.5–7 cm. long, entire or irregularly denticulate, the petioles shorter or about as long; scape 10–20 cm. high, mostly 10–20-flowered; pedicels longer than the bracts; calyx-lobes ovate, acutish, barely 2 mm. long; petals yellowish white, oblong-obovate, 7–8 mm. long; style 10 mm. long, strongly declined in flower; anthers 2 mm. long.

Dry humus soils in coniferous forests, Humid and Arid Transition Zones; Vancouver Island, British Columbia, south to southern California and east to Montana and New Mexico. Type locality: on the Northwest Coast. Collected by Menzies on the Vancouver voyage. June–Aug.

5. *Pyrola dentata* Smith. Nootka Wintergreen. Fig. 3655.

Pyrola dentata Smith in Rees, Cycl. 29: no. 6. 1814.

Pyrola picta subsp. *dentata* Piper, Contr. U.S. Nat. Herb. 11: 434. 1906.

Stems above ground short, mostly 2–5 cm. high, arising from branching rootstocks. Leaves several, coriaceous, oblanceolate to spatulate, 3–6 cm. long, acutish or rounded at apex, gradually attenuate into the petiole which is usually shorter than the blade, entire or regularly denticulate, dull green above, very obscurely if at all whitened along the veins; scapes 10–25 cm. high; racemes 5–20-flowered; pedicels slender, 5–10 mm. long; bracts 1–3 mm. long; calyx-lobes triangular, acute, barely 2 mm. long; petals cream-colored, obovate, 6–8 mm. long; style 7 mm. long.

Dry slopes or open forests, mainly Humid Transition Zone; Vancouver Island, British Columbia, south through the Coast Ranges to Del Norte County, California. In the Siskiyou Mountains and the Mount Shasta region are many intermediates between the typical species and the variety. Type locality: west coast of North America. June–Aug.

Pyrola dentata var. *integra* A. Gray, Pacif. R. Rep. 12²: 54. 1860. (*Pyrola pallida* Greene, Pittonia 4: 39. 1899.) Leaves more or less glaucous-green, mostly broadly obovate to suborbicular, rounded at apex, entire or rarely denticulate, 1.5–3 cm. long, mostly abruptly narrowed at base to a petiole longer than the blade. Dry mountain sides, Arid Transition and Canadian Zones; eastern slopes of the Cascade Mountains, from Yakima County, Washington, to Crater Lake and the mountains of eastern Oregon, and in California from the Sierra Nevada to the San Bernardino Mountains. Type locality: on high wooded hills east of Mount Adams, Washington. The shape of the leaves rather than the toothed or entire margin correlates better with the geographic distribution.

6. *Pyrola aphylla* Smith. Leafless Pyrola. Fig. 3656.

Pyrola aphylla Smith in Rees, Cycl. 29: no. 7. 1814.

Pyrola aphylla var. *paucifolia* Howell, Fl. N.W. Amer. 425. 1901.

Rootstocks branched and often contorted and stoutish. Leaves commonly reduced to sessile bracts or sometimes developing small green blades; scapes stout to rather slender, 1-3 dm. high, reddish, usually with a few scattering lanceolate acuminate scarious bracts; racemes open and few-flowered or densely many-flowered; floral bracts lanceolate, shorter than the pedicels; calyx reddish purple, its lobes deltoid or ovate-lanceolate, about 2 mm. long; petals broadly ovate, cream-colored on the margins, usually reddish on the back.

Open or dense forests, Humid and Arid Transition Zones; British Columbia south through the Pacific States to southern California, east to Idaho and western Nevada. Type locality: "on the west coast of North America." Collected by Menzies at Nootka Sound according to Don. These plants suggest at least a semi-saprophytic habit, but Holm (Bot. Gaz. 45: 246-54) demonstrated that they are neither saprophytic nor parasitic but autophytic. The two forms, one with reddish the other with cream-colored flowers, would suggest that they may have arisen from different ancestry, one strain stemming from *Pyrola picta*, the other from *Pyrola dentata*. June-Aug.

7. *Pyrola minor* L. Common or English Wintergreen. Fig. 3657.

Pyrola minor L. Sp. Pl. 396. 1753.

Perennial herb with a slender rootstock; scape slender, 8-25 cm. high, naked or with 1-2 scarious bracts. Leaves broadly oval to suborbicular, 1-3 cm. long, crenulate often obscurely so, rounded or slightly cordate at base, dark green and thin; petioles often as long or longer than the blades; flowers racemose, nodding, white or pinkish; pedicels 3-5 mm. long, about equaling the narrowly lanceolate bracts; calyx-lobes triangular, barely 2 mm. long; petals connivent, 4-5 mm. long, oval to orbicular, obtuse; style straight, included; stamens not declined, connivent around the pistil; capsule depressed-globose, about 5 mm. broad.

In woods, mainly Canadian Zone; Alaska to southern California east to Greenland, and New England; also in Europe and Asia. In the Pacific States it is on the eastern slopes of the Cascade Mountains and in the Blue and Wallowa Mountains, Washington and Oregon, and sparingly in the Sierra Nevada and San Bernardino Mountains, California. Type locality: "habitat in Europa frigidiore." June-Aug.

8. *Pyrola secunda* L. One-sided or Serrated Wintergreen. Fig. 3658.

Pyrola secunda L. Sp. Pl. 396. 1753.

Ramischia secunda Garcke, Fl. Deutschl. ed. 4. 222. 1858.

Perennial herbs, often more or less suffrutescent, with long creeping rootstocks; stems above ground often lignescent; scapes 8-18 cm. high, with 1-2-scarious bracts. Leaves oval to ovate, 2.5-7 cm. long, on petioles about half to nearly as long, rounded to obtuse at base, acute at apex, crenulate-serrate; flowers many in a one-sided raceme, erect in bud, drooping in anthesis; pedicels short; calyx-lobes ovate, obtuse, short, minutely sinuate; petals white or pinkish, about 5 mm. long, broadly oval, connivent; style straight, exserted, longer than the capsule in fruit.

Woods and banks of wooded streams, Humid Transition and Canadian Zones; in the Pacific States occurring both in the western and eastern parts of Washington and Oregon and extending through the Coast Ranges and the Sierra Nevada to the mountains of southern California; also widespread over North America and Eurasia. Type locality: woods of northern Europe. June-Aug.

2. *MONÈSES* Salisb. ex S. F. Gray, Nat. Arr. Brit. Pl. 2: 403. 1821.

Glabrous perennial herbs with slender rootstocks. Leaves opposite or mostly in threes, petioled, persistent. Scape bearing a solitary drooping pink or white flower at the summit. Sepals 5, persistent, inserted on a callous base. Petals 5, ovate, spreading and nearly plane. Stamens 10, their filaments dilated at base; anthers oblong, prolonged into 2 distinct curved tubes at the apex. Pistil of 5 united carpels; style straight, longer than the ovary; stigma peltate with 5 marginal papillae. Capsule subglobose, obtusely 5-angled, loculicidally 4-5-valved from the summit. Seeds numerous, minute. [Name Greek, meaning single and delight, from the single flower.]

A monotypic genus inhabiting the cooler parts of the northern hemisphere.

1. *Moneses uniflora* (L.) A. Gray. Moneses. Fig. 3659.

Pyrola uniflora L. Sp. Pl. 397. 1753.

Moneses grandiflora S. F. Gray, Nat. Arr. Brit. Pl. 2: 403. 1821.

Moneses uniflora A. Gray, Man. 273. 1848.

Perennial with a very slender creeping rootstock, stem above ground slender, erect, 1-3 cm. high. Leaves in 1-4 verticils of 2-4 leaves each, orbicular, broadly oval, ovate or obovate, rounded or obtuse at apex, 1-2.5 cm. long, often decurrent at base on the slightly shorter petiole, crenate-serrate at least above the middle, rather thin and obscurely veined; scape 4-10 cm. high, naked or with a single elliptic bract borne above the middle; sepals oblong-elliptic, 3 mm. long, thin and whitish, ciliolate on the margin; petals white or pinkish, ovate, obtuse, about 1 cm. long; tubes of the anther strongly curved; capsule 6-8 mm. in diameter.

Woods, Canadian Zone; Alaska to eastern Washington and eastern Oregon, across the continent to Labrador,

Pennsylvania and New Mexico. Type locality: woods of northern Europe. May–Aug. Forest or One-flowered Wintergreen.

Moneses uniflora var. *reticulata* (Nutt.) Blake, *Rhodora* 17: 28. 1915. (*Moneses reticulata* Nutt. Trans. Amer. Phil. Soc. 8: 271. 1843.) Leaves ovate, acute or acutish, rather sharply serrate instead of crenate, veins more prominent. Forests of the Canadian and Humid Transition Zones; southern Alaska along the coast to Vancouver Island and southward, west of the Cascade Mountains, to Humboldt County and vicinity of Mount Shasta, California. Type locality: "fir woods and the Columbia not far from the sea."

3. CHIMAPHILA Pursh, Fl. Amer. Sept. 279. 1814.

Suffrutescent perennials, with creeping rootstocks, and branching stems. Leaves verticillate or subverticillate. Short-petioled, evergreen and coriaceous, serrate. Flowers racemose, corymbose or corymbose-umbellate, rarely solitary. Sepals 5. Petals 5, white or purplish. Stamens 10, filaments dilated below forming a disk near the base, then curved upwards; anther-sacs prolonged into tubes at apex. Pistil of 5 united carpels; ovary 5-lobed; style very short, straight; stigma peltate, without papillae. Capsule 5-celled, depressed-globose to obovoid, loculicidally dehiscent from the apex, the valves without threads on the margin. Seeds numerous, minute. [Name Greek, meaning winter-loving, from its evergreen foliage.]

A genus of 6 to 8 species, natives of North America and northeast Asia. Type species, *Pyrola maculata* L.
Leaves oblanceolate, many; bracts linear-subulate; flowers 3–6. 1. *C. umbellata occidentalis*.
Leaves ovate, few; bracts obovate; flowers 1–3. 2. *C. Menziesii*.

1. *Chimaphila umbellata* var. *occidentalis* (Rydb.) Blake. Western Prince's Pine. Fig. 3660.

Chimaphila occidentalis Rydb. N. Amer. Fl. 29: 30. 1914.

Chimaphila umbellata var. *occidentalis* Blake, *Rhodora* 19: 242. 1917.

Plants suffrutescent, 1–2 dm. high; stems branched, usually greenish, terete. Leaves in whorls of 3–8, broadly to narrowly oblanceolate or narrowly oblong, 2–7 cm. long, sharply and rather remotely serrulate except toward the base, dark glossy green above, pale often yellowish green beneath; flowers corymbose or racemose-corymbose, 3–8; bracts linear-subulate, deciduous; petals tinged with pink, oval, 5–6 mm. long, concave, ciliolate; dilated portion of filaments ovoid, ciliolate; capsule subglobose, 6–7 mm. in diameter; fruiting pedicels erect, the lower longer.

On shrub-covered slopes in coniferous forests, Transition and Canadian Zones; British Columbia southward through the Pacific States in both the Coast Ranges and the Cascades to the Sierra Nevada and the mountains of southern California, east to Montana, Colorado and Utah. Type locality: "valley of Pine Creek, near Farmington, Latah County, Idaho." June–Aug.

2. *Chimaphila Menziesii* (R. Br.) Spreng. Little Prince's Pine or Pipsissiwa. Fig. 3661.

Pyrola Menziesii R. Br. ex D. Don, Mem. Wern. Soc. 5: 245. 1824.

Chimaphila Menziesii Spreng. Syst. 2: 317. 1825.

Suffrutescent perennial, with a slender rootstock; stems erect, simple or sparingly branched above ground, 5–20 cm. high, glabrous and reddish. Leaves irregular in arrangement, opposite or subverticillate, or some alternate to lanceolate to lanceolate-elliptic or narrowly ovate, acute at apex, narrowed at base to a short petiole, 2–6 cm. long, rather sharply serrate, glabrous, coriaceous, dark green and shining above, pale beneath; peduncles mostly 4–5 cm. long; corymbs 2 to several-flowered or the flowers sometimes solitary; pedicels erect or spreading, becoming 2–4 cm. long in fruit; bracts broadly ovate or obovate, scarious, usually persistent until well after anthesis; sepals rounded, erose; petals spreading, white or pinkish, suborbicular, concave, 5–6 mm. long; dilated portion of filaments obcordate, ciliate; capsule 5–6 mm. in diameter.

In woods, Transition and Canadian Zones; British Columbia south through the Pacific States in the Coast Ranges, Cascade Mountains and the Sierra Nevada to the Cuyamaca Mountains, southern California, east to Idaho. Type locality: northwest coast of America. June–Aug.

Family 113. MONOTROPACEAE.

INDIAN-PIPE FAMILY.

Saprophytic plants or root-parasites, varying in color from white to bright red. Stems scapose slender or thick and fleshy. Leaves reduced to bract-like scales, without chlorophyll. Flowers solitary, racemose or corymbose, perfect, regular or slightly irregular, bracteate. Calyx 2–6-lobed, free from the ovary. Corolla sympetalous or choripetalous 4–5 merous, wanting in *Allotropa*. Stamens 6–12, hypogynous; filaments distinct or united at base; anthers attached to the filaments by their backs or bases, 1- or 2-horned; pollen-grains simple. Disk when present, 8–12-lobed. Ovary superior, 1–6-celled, 4–6-lobed; style short or elongated; stigma simple, capitate or peltate; ovules many, anatropous. Capsule loculicidally 4–6-

valved; placentation parietal, or parietal above and axile below. Seeds numerous, minute, with reticulated testa.

A family of 12 genera and about 15 species, inhabiting the northern hemisphere, but mostly restricted to western North America. A series of papers on the morphology of this interesting plant family has been published recently in Madroño by Dr. Herbert F. Copeland.

Ovary 4-6-celled, with a central column.

Corolla wanting; flowers spicate.

1. *Allotropa*.

Corolla present; flowers solitary, racemose or corymbose.

Petals distinct.

Flower solitary at the apex of the scape.

2. *Monotropa*.

Flowers in a terminal 1-sided raceme.

3. *Hypopitys*.

Petals more or less united.

Corolla urceolate; anthers horned.

4. *Pterospora*.

Corolla campanulate; anthers not horned.

5. *Sarcodes*.

Ovary 1-celled, without a central column.

Petals distinct.

Anthers short, as broad as long; filaments pubescent.

6. *Pityopus*.

Anthers elongated; filaments glabrous.

7. *Pleuricospora*.

Petals partly united; filaments pubescent.

8. *Hemitomes*.

1. *ALLÓTROPA* Torr. & Gray ex A. Gray, Proc. Amer. Acad. 7: 368. 1868.

Simple-stemmed saprophytic herb, with glabrous reddish-tinged herbage. Leaves elongated, scale-like, numerous and often crowded toward the base of the stem. Flowers many, in an erect elongated spike-like raceme. Sepals 5, distinct, broad. Petals none. Stamens 10, with slender filaments, slightly exserted; anthers short, slightly lobed, extrorse in bud, and introrse in anthesis, the sacs opening by a chink to the middle. Ovary subglobose, 5-celled; style short, stout; stigma peltate-capitate, shallowly 5-lobed. Capsule depressed, loculicidal; placentae axile below, parietal above, subtended by the persistent calyx. Seeds numerous, minute, linear. [Name Greek, meaning different turning, the inflorescence not drooping as in *Monotropa*.]

A monotypic genus of the Pacific Coast of North America.

1. *Allotropa virgata* Torr. & Gray. Sugar Stick. Fig. 3662.

Allotropa virgata Torr. & Gray ex A. Gray, Proc. Amer. Acad. 7: 368. 1868.

Stem erect, simple, rather stout, 15-55 cm. high, often thickened at base, reddish with longitudinal white stripes. Leaves thick, ovate to ovate-lanceolate at base, those above narrowly lanceolate and longer, usually 25-30 mm. long; raceme spicate, elongated, densely flowered, often about half the length of the stem; bracts similar to the upper leaves but narrower and shorter; flowers on very short stout pedicels; sepals ovate or rhomboidal, 5-6 mm. long, erose, thin and whitish; stamens exceeding the sepals; anthers purple-black; capsule depressed-globose, 4-5 mm. broad.

Deep woods in rich humus, Transition and Canadian Zones; British Columbia southward in the Coast Ranges to northwestern California, and in the Cascade Mountains and Sierra Nevada to Tulare County, California. Type locality: Cascade Mountains, Washington. June-Aug.

2. *MONÓTROPA* L. Sp. Pl. 387. 1753.

Saprophytic herbs without chlorophyll, the whole plant white, pink or red. Stems simple, clothed with numerous bract-like leaves. Flower solitary, terminal, nodding in anthesis, erect in age. Sepals 2-4, distinct and deciduous. Petals 5 or 6, oblong, dilated toward the apex and somewhat saccate at base. Stamens 10-12, included; filaments slender; anthers, short peltate, opening by 2 transverse chinks. Ovary 5-6-celled; style short, thick; stigma disk-like, with crenate margin. Capsule ovoid-globose, loculicidal; placentae axile below, parietal above. Seeds numerous, minute. [Name Greek, meaning once-turned.]

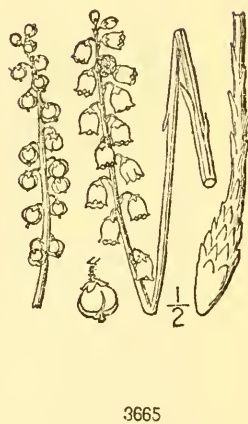
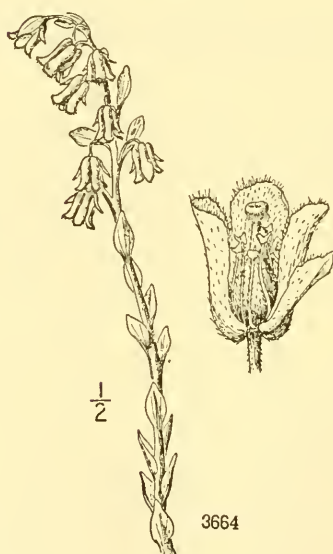
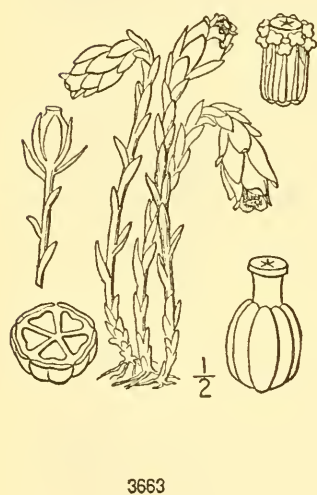
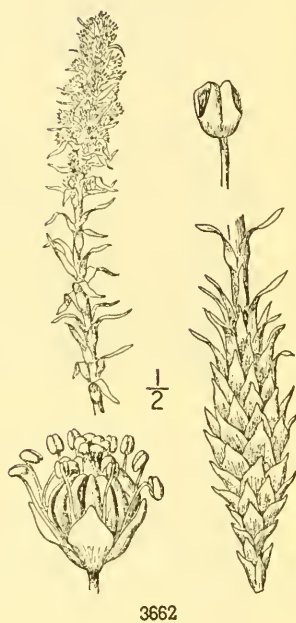
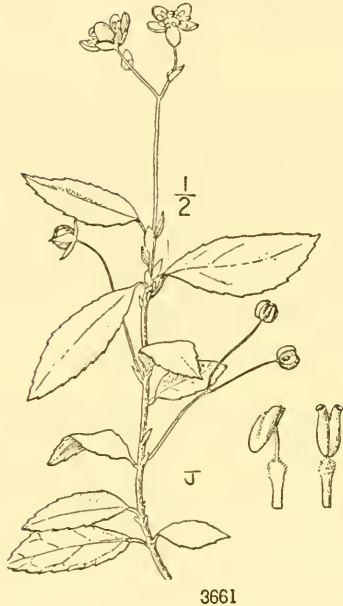
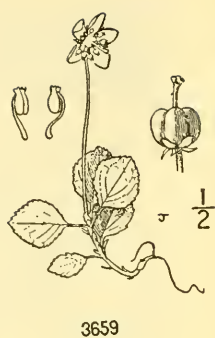
A genus of 2 species, besides the following which is the type of the genus, *M. coccinea* Zucc. inhabits Mexico, Central America and Colombia.

1. *Monotropa uniflora* L. Indian Pipe. Fig. 3663.

Monotropa uniflora L. Sp. Pl. 387. 1753.

Stems simple, 15-30 cm. high, white or sometimes tinged with rose, drying black, usually several arising from a mass of brittle roots. Leaves scale-like, 5-10 mm. long; flower solitary, nodding, oblong-campanulate; sepals oblong to oblong-spatulate, 14-18 mm. long, glabrous or ciliate on the margins near the base, often erose toward the apex; petals exceeding the sepals, oblong-spatulate; filaments pubescent; capsule oblong-ovoid, 10-15 mm. long.

Deep moist woods, in rich humus, Transition and Canadian Zones; Alaska to Labrador south to California, Florida and Mexico; also India and Japan. Type locality: Maryland. June-Oct.



3657. *Pyrola minor*
3658. *Pyrola secunda*
3659. *Moneses uniflora*

3660. *Chimaphila umbellata*
3661. *Chimaphila Menziesii*
3662. *Allotropa virgata*

3663. *Monotropa uniflora*
3664. *Hypopitys lanuginosa*
3665. *Pterospora Andromedea*

3. *HYPÓPITYS* Hill, Brit. Herb. 221. 1756.

Saprophytic plants without green chlorophyll, varying in color from white to yellow, arising from a dense mass of fleshy roots. Leaves scale-like. Flowers in a terminal raceme, which is usually nodding before and during anthesis, and erect in fruit. Sepals 5, or in the later flowers usually 4 or rarely 3. Petals as many as sepals. Stamens 6–10, included; anthers horizontal, opening by 2 unequal valves. Ovary 3–5-celled; style slender; stigma funnelform; glandular-ciliate on the margin. Capsule 3–5-celled, loculicidal; placentae axile below, parietal above. [Name Greek, referring to its growth under firs.]

A genus of 3 or 4 species, of the north temperate region. Type species, *Monotropa Hypopitys* L.

1. *Hypopitys lanuginosa* (Michx.) Nutt. American Pine-sap. Fig. 3664.

Monotropa lanuginosa Michx. Fl. Bor. Amer. 1: 266. 1803.

Hypopitys lanuginosa Nutt. Gen. 1: 271. 1818.

Hypopitys latisquama Rydb. Bull. Torrey Club 40: 461. 1913.

Hypopitys brevis Small, N. Amer. Fl. 29: 13. 1914.

Plants yellowish, tinged with pink or crimson, finely pubescent, 1–3 dm. high. Leaves scale-like, oblong-ovate, 5–8 cm. long; flowers few and separated, or more numerous and crowded; pedicels about equaling or shorter than the flowers; sepals cuneate to narrowly oblanceolate, 6–10 mm. long; ciliate and often erose on the margins, acute or acuminate; petals cuneate to cuneate-oblong, 10–12 mm. long, coarsely pubescent without and ciliate on the margins; filaments and style pubescent; stigma retrorsely bearded on the margin; capsule 4–5 mm. long.

Moist woods in deep humus, mainly Humid Transition Zone; British Columbia south in the Pacific States along the Coast Ranges and the Cascade Mountains to northwestern California, east to the Atlantic Coast. Type locality: North Carolina, July–Aug.

Hypopitys fimbriata (A. Gray) Howell, Fl. N.W. Amer. 429. 1901. (*Monotropa fimbriata* A. Gray, Proc. Amer. Acad. 8: 629. 1873.) Very similar to the preceding species from which it differs in having more or less fimbriate leaves and sepals, a character that has proved inconstant. Western Oregon, and northwestern California. Type locality: Oregon.

4. *PTERÓSPORA* Nutt. Gen. 1: 269. 1818.

Saprophytic herb with brownish or purplish glandular-pubescent herbage, the stems simple. Leaves scale-like, narrow and elongated, mostly near the base. Flowers numerous, nodding, borne in an elongated narrow open raceme, nodding on recurved pedicels. Sepals 5, narrow, slightly united at base. Corolla urceolate, with 5 short recurved lobes, marcescent. Stamens 10, included; filaments slender; anthers with 2 dorsal appendages, dehiscing by longitudinal slits. Ovary 5-celled, depressed-globose; style short, stout; stigma capitate-peltate, shallowly 5-lobed. Capsule strongly depressed, 5-lobed loculicidal; placentae axile below, parietal above. Seeds numerous, broadly winged at the apex. [Name Greek, meaning winged and seed.]

A monotypic genus of temperate North America.

1. *Pterospora Andrómeda* Nutt. Pinedrops. Fig. 3665.

Pterospora Andromeda Nutt. Gen. 1: 269. 1818.

Stems 3–10 dm. high, viscid-pubescent, arising from a thick ball-like mass of roots. Leaves crowded below, linear-lanceolate, 15–35 mm. long, the upper scattered and smaller; raceme erect and virgate, 1–5 dm. long; sepals linear-lanceolate, 4–5 mm. long, glandular-pubescent; corolla 7–8 mm. long, white, the lobes short, rounded; horns of the anthers about as long as the pollen-sacs; capsule strongly depressed-globose, 8–12 mm. broad.

Coniferous forests, growing in humus, Transition and Canadian Zones; British Columbia to Quebec, in the Eastern States extending south to Pennsylvania, in the Rocky Mountains to northern Mexico, and in the Pacific States to southern California. Type locality: near Niagara Falls, Canada, June–Aug.

5. *SARCÔDES* Torr. Smiths. Contr. 67: 17. 1853.

Saprophytic herb with red, usually bright-red, pubescent herbage. Stem thick and fleshy, simple, growing singly or often clustered. Leaves scale-like, crowded and usually imbricated at the base of the stem, elongated and more distant above. Flowers in a short, stout, many-flowered terminal raceme, nodding on the ends of ascending pedicels, subtended by large, conspicuous bracts. Sepals 5, slightly united at the base, narrow. Corolla campanulate, marcescent, the lobes broad, shorter than the tube, slightly spreading. Stamens 10, included; filaments slender, glabrous; anthers without appendages, opening at the apex. Ovary subglobose, 5-lobed, 5-celled; style stout; stigma subcapitate, shallowly 5-lobed. Capsule depressed-globose, fleshy, opening at base of style, placentae axile below, parietal above. Seeds small, favose, not winged. [Name Greek, meaning flesh-like.]

A monotypic genus of the Pacific Coast of North America.

1. *Sarcodes sanguinea* Torr. Snow Plant. Fig. 3666.

Sarcodes sanguinea Torr. Smiths. Contr. 67: 18. pl. 10. 1853.

Stem stout, 2–6 dm. high, often slightly decumbent at base, arising from a thick fleshy mat of roots. Leaves ciliate on the margins, the lower ovate to ovate-lanceolate, 2–3 cm. long, the upper strap-shaped and 5–10 cm. long; bracts conspicuous; sepals broadly lanceolate, 10–15 mm. long; corolla slightly exceeding the calyx, red, glabrous, the lobes rounded, undulate; capsule depressed-globose, 5-lobed, 1–2 cm. broad, subtended by the persistent calyx.

Coniferous forests, Arid Transition Zone; Cascade Mountains, southern Oregon, south to southern California. Type locality: probably on the Yuba River, California. May–June.

6. *PITYOPUS* Small, N. Amer. Fl. 29: 16. 1914.

Saprophytic herb with white usually glabrous herbage. Stem simple, clothed with crowded or approximate, erect, scale-like leaves, and terminated by a dense bracteate spike or spike-like raceme. Sepals 4 or rarely 5, distinct, persistent. Petals of the same number as sepals, distinct. Stamens twice as many as petals, included; filaments slender, pubescent; anthers short, about as broad as long, the sacs opening from the base by longitudinal slits. Ovary ovoid, 1–2-celled, with parietal placentae, 4–5-lobed, each lobe with 2 ribs; style cylindric, about as long as the ovary, pubescent; stigma strongly depressed. Fruit somewhat fleshy, ovoid, 1-celled. [Name Greek, meaning pine and foot in reference to the habitat of these plants.]

A monotypic genus of the Pacific States.

1. *Pityopus californica* (Eastw.) Copel. f. *Pityopus*. Fig. 3667.

Monotropa californica Eastw. Bull. Torrey Club 29: 75. 1902.

Pityopus oregona Small, N. Amer. Fl. 29: 16. 1914.

Monotropa Hypopitys var. *californica* Domin, Sitzber. Böhm. Ges. Wiss. Prag. Classe 1915: 24. 1915.

Pityopus californica Copel. f. Madroño 3: 155. 1935.

Stem rather stout, 10–15 cm. high, glabrous. Leaves deltoid to triangular-lanceolate below, becoming lanceolate on the upper part of the stem, entire or erose; bracts similar to the upper leaves, shorter than the flowers; sepals rhombic-ob lanceolate to linear, about 12 mm. long; petals equaling or slightly longer than the sepals, oblong-obovate, pubescent within.

Deep coniferous woods, Canadian Zone; Cascade Mountains, Oregon, south to Fresno County, California, and in the Coast Ranges from Curry County, Oregon, to Marin County, California. Type locality: dense forest north of Mount Hood, Oregon. June–Aug.

7. *PLEURICÓSPORA* A. Gray, Proc. Amer. Acad. 7: 369. 1868.

Saprophytic herb with white or brownish herbage. Stem simple, terminated by a short spike-like raceme. Leaves scale-like, approximate or scattered. Flowers subtended by broad, conspicuous bracts. Sepals 4 or 5, distinct, persistent. Petals as many as sepals, persistent. Stamens 8 or 10, with slender, glabrous filaments; anthers dehiscing by a longitudinal slit. Ovary ovoid, 1-celled, with parietal placentae; style short, stout; stigma depressed-capitate. Fruit a berry, ovoid, 1-celled, not lobed. [Name Greek, meaning at the side and seed, in reference to the parietal placentae.]

A genus of 1 or possibly 2 species of the Pacific Coast of North America. Type species, *Pleuricospora fimbriolata* A. Gray.

1. *Pleuricospora fimbriolata* A. Gray. *Pleuricospora* or Fringed Pine-sap. Fig. 3668.

Pleuricospora fimbriolata A. Gray, Proc. Amer. Acad. 7: 369. 1868.

Stem rather stout, 10–25 cm. high, glabrous. Leaves thick, ovate to ovate-lanceolate, the lower entire or erose, the upper fimbriate; flowers in a rather loosely flowered or dense spike, or narrow raceme; bracts similar to the upper leaves; flowers erect or ascending; sepals ovate-lanceolate to linear-lanceolate, 6–9 mm. long, erose-fimbriate acuminate and involute; petals narrowly elliptic to oblong-lanceolate, about equaling the sepals, entire or sparingly fimbriate.

Coniferous forests, Transition and Canadian Zones; British Columbia to Central California. Type locality: Mariposa Grove, California. June–Aug.

Pleuricospora longipétala Howell, Fl. N.W. Amer. 429. 1901. This apparently local species may not be distinct from the preceding. It is characterized by the more slender inflorescence, fimbriate lower leaves, and more especially by the spatulate petals which exceed the sepals, and are usually fimbriate at the apex. Known only from collections made near the hot springs, Clackamas County, Oregon.

8. *HEMITÔMES* A. Gray, Pacif. R. Rep. 6: 80. 1858.

Fleshy saprophytic herbs, flesh-pink turning brown in age, the stems simple, often mainly subterranean. Leaves scale-like, imbricated, at least below. Flowers in a short dense terminal spike or in a dense corymbiform head, subtended by broad bracts. Sepals 2 or 4, narrow. Corolla tubular-campanulate, often slightly constricted at the throat, pubescent within, 4–6-lobed. Stamens 8–10; filaments slender, long-pubescent; anthers oblong, erect on the filaments, dehiscing by a longitudinal slit. Ovary 1-celled, with 4–5 two-lobed placentae; style pubescent; stigma depressed-capitate, subtended by a tuft of

retrorse hairs. Fruit a fleshy 1-celled usually ovoid berry. [Name from the two Greek words meaning half and eunuch, one of the anther-cells often sterile.]

A monotypic genus, restricted to the Pacific Coast region of North America. Type species, *Hemitomes congestum* A. Gray.

1. *Hemitomes congestum* A. Gray. *Hemitomes*. Fig. 3669.

Hemitomes congestum A. Gray, *Pacif. R. Rep.* 6³: 81. 1858.

Newberrya congesta Torr. ex A. Gray, *Bot. Calif.* 1: 464. 1876.

Newberrya spicata A. Gray, *Proc. Amer. Acad.* 15: 44. 1879.

Hemitomes pumilum Greene, *Erythea* 2: 121. 1894.

Newberrya subterranea Eastw. *Proc. Calif. Acad.* III. 1: 80. 1897.

Newberrya longiloba Small, *N. Amer. Fl.* 29: 18. 1914.

Stems 5–15 cm. high, stout, terminated by a compact corymbiform head. Leaves closely imbricated, ovate, obtuse, erose and irregularly ciliate; outer flowers of the head in 3–5-flowered cymes, the central flower of each cyme with 4 linear acute entire or somewhat ciliate sepals, the other flowers of the cyme smaller with 2 smaller sepals; corolla broadly tubular-urceolate, 12–14 mm. long; lobes of the central flowers ovate, about one-third as long as the tube, those of the marginal flowers extending nearly to the base of the corolla, hairy on the inside, erect or slightly spreading; anthers narrowly oblong.

Coniferous woods, Transition Zone; Olympic Mountains, Washington, to central California. Type locality: Upper Deschutes Valley, Oregon. May–July.

Family 114. ERICACEAE.

HEATH FAMILY.

Trees, shrubs or undershrubs. Leaves simple, alternate or opposite, evergreen or deciduous, without stipules. Flowers borne in clusters or rarely solitary, perfect. Calyx 4–7-parted or -cleft, persistent. Corolla sympetalous, except in two genera, regular or slightly irregular, variously shaped. Stamens hypogynous, usually twice as many as the lobes of the corolla, alternate with them when equal in number; filaments distinct or occasionally slightly connate; anthers 2-celled, attached to the filament at the back or at the base, dehiscent by longitudinal slits, terminal pores or apical tubes, sometimes appendaged on the back. Ovary superior, 2–4-lobed, sessile on the receptacle or on a more or less lobed disk; ovules anatropous, 1 to many in a cell on axile placentae. Style simple, columnar to ovoid. Stigma capitate or peltate, entire or shallowly lobed. Fruit a naked capsule, a capsule enclosed by the fleshy calyx, a berry or drupe. Seeds winged in a few genera, endosperm fleshy.

About 55 genera and over 1,100 species, of almost world-wide distribution.

Fruit a capsule. (In the genus *Gaultheria* the calyx becomes accrescent and fleshy.)

Calyx not accrescent and not inclosing the capsule in fruit.

Capsule septicidal; anthers awnless.

Petals distinct.

Anther-sacs opening by longitudinal slits; calyx-lobes long and narrow; flowers solitary in the axils. 1. *Cladothamnus*.

Anther-sacs opening by apical pores; calyx-lobes short and broad; flowers in terminal cymose or umbellate clusters. 2. *Ledum*.

Petals united below; anthers opening by terminal pores.

Flower-buds and usually leaf-buds scaly-strobilaceous.

Flowers 5-merous; corolla funnelform to campanulate.

3. *Rhododendron*.

Flowers 4-merous; corolla urceolate to cylindraceous.

4. *Menziesia*.

Flower-buds and leaf-buds not scaly-strobilaceous.

Corolla saucer-shaped or nearly so; dwarf shrubs not heath-like.

Leaves glandular-dotted beneath; corolla not saccate.

5. *Kalmiopsis*.

Leaves not glandular-dotted beneath; corolla 10-saccate.

6. *Kalmia*.

Corolla campanulate to urceolate; dwarf heath-like shrubs.

7. *Phyllococe*.

Capsule loculicidal; anthers awned or with a minute mucronation, opening by apical pores or by chinks above the middle.

Corolla campanulate; anthers distinctly awned; leaves crowded or imbricate.

Leaves decussately opposite; corolla-lobes much shorter than the tube.

8. *Cassiope*.

Leaves alternate, narrow; corolla-lobes equaling the tube or longer.

9. *Harrimannella*.

Corolla urceolate; anther-sacs awnless but with a minute mucronation.

10. *Leucothoe*.

Calyx accrescent, becoming fleshy and enclosing the capsule in fruit.

11. *Gaultheria*.

Fruit a berry or drupe.

Cells of the ovary many-ovuled; berry granular-papillose.

12. *Arbutus*.

Cells of the ovary 1-ovuled; drupe with the several stones separate or united.

Drupe papillose and fleshy; stone of few firmly united carpels.

13. *Comarostaphylis*.

Drupe smooth, glabrous or pubescent; stones separate or irregularly coalescent or firmly united.

Leaves not vertical, revolute; carpels united into a solid 3–5-celled stone; filaments slender.

14. *Xylococcus*.

Leaves usually vertical, plane; stones distinct or irregularly united; filaments much-dilated at base.

15. *Arctostaphylos*.

1. CLADOTHÁMNUS Bong. Mém. Acad. St. Pétersb. VI. 2: 155. 1832.

Shrubs with erect stems. Leaves deciduous, alternate, scattered or often crowded at the ends of the branchlets, thin and entire. Flowers perfect, solitary or in few-flowered axillary corymbose clusters. Calyx rotate, the lobes 5, narrow, much exceeding the very short tube. Petals distinct, 5, narrow, spreading in anthesis. Stamens 10, shorter than the petals, declined; filaments subulate; anthers much shorter than the filaments, opening from the apex almost to the base by a longitudinal slit. Ovary 5-6-celled, depressed, septically 5-6-valved; style elongated; stigma capitate. [Name from two Greek words meaning branch and bush.]

A monotypic genus of northwestern America.

1. *Cladothamnus pyrolaeiflorus* Bong. *Cladothamnus*. Fig. 3670.

Cladothamnus pyrolaeiflorus Bong. Mém. Acad. St. Pétersb. VI. 2: 155. 1832.

Tolmiea occidentalis Hook. Fl. Bor. Amer. 2: 44. 1834.

Erect shrub, up to 2 m. high, the young branchlets brownish, glabrous. Leaves oblanceolate to oblong-oblanceolate, 15-45 mm. long, obtuse or rounded at the apex, narrowed below to a short petiole, entire, light green and very thin; pedicels slender, about 15 mm. long, glabrous or sometimes sparsely puberulent; calyx-lobes herbaceous, 4-5 mm. long, ciliate; petals 10 mm. long, oblong-oblanceolate, copper-colored; capsule 5 mm. high, depressed-globose.

Growing near timber line, Hudsonian Zone; Alaska to northwestern Oregon. Rare in the Pacific States; the only known localities are: Mount Baldy, Olympic Mountains, and Mount Baker and Mount Shuskan, Whatcom County, Washington; Saddle Mountain, Clatsop County, Oregon. Type locality: Sitka, Alaska.

2. LĒDUM L. Sp. Pl. 391. 1753.

Erect branching shrubs with resinous fragrant foliage. Leaves alternate, leathery and persistent, linear or oblong, entire. Flowers perfect, in terminal umbel-like racemes from large scaly buds, the new growth of the season originating at the base of the flower clusters. Pedicels erect in anthesis, nodding in fruit. Calyx very small, rotate, 5-lobed. Petals 5, distinct, widely spreading, oblong to obovate. Stamens 5-10, equaling or slightly exceeding the petals; anthers oval or oblong, much shorter than the slender filaments, opening by terminal pores. Ovary 5-celled, oblong or obovoid, slightly lobed; style elongate and persistent; ovules numerous. Capsules oblong or subglobose, obscurely lobed, septically 5-valved from the base. Seeds many, minute, elongate, winged. [Name from *Ledon*, the ancient Greek name for the plant now known as *Cistus Ledon*.]

A genus of 4 species, natives of the north temperate and subarctic regions; besides the following, the type species, *Ledum palustre* L., occurs in North America from Alaska to Newfoundland and also in Europe and Asia.

Leaves densely rusty-tomentose beneath.

1. *L. groenlandicum*.

Leaves resinous-glanduliferous and pale beneath, not tomentose.

Fruit subglobose; leaves flat, scarcely if at all revolute.

2. *L. glandulosum*.

Fruit oblong; leaves conspicuously revolute.

3. *L. columbianum*.

1. *Ledum groenlandicum* Oeder. Labrador Tea. Fig. 3671.

Ledum groenlandicum Oeder, Fl. Dan. 4^{to}: 5. pl. 567. 1771.

Ledum latifolium Ait. Hort. Kew. 2: 65. 1789.

Erect shrub, 1-1.5 m. high, with tomentose branchlets. Leaves elliptic to oblong, 2-6 cm. long, the margins strongly revolute; petioles very short, not over 3 mm. long; pedicels slender, 20-25 mm. long, glandular and finely pubescent; petals white, 5-8 mm. long, oblong, rounded at the apex and narrowed at the base; stamens 5-7; filaments glabrous or sometimes pubescent at base; capsule oblong, 5-7 mm. long, about twice as long as thick.

Cold marshes and sphagnum bogs, Humid Transition and Canadian Zones; Alaska to western Washington and Tillamook County, Oregon; eastward to New England, Labrador, and Greenland. Type locality: Greenland. May-July.

2. *Ledum glandulosum* Nutt. Glandular Labrador Tea. Fig. 3672.

Ledum glandulosum Nutt. Trans. Amer. Phil. Soc. II. 8: 270. 1843.

Ledum californicum Kell. Proc. Calif. Acad. 2: 14. 1863.

Stout erect shrub, 1-2 m. high, or lower at high elevations, bark tardily exfoliating, twigs puberulent and glandular. Leaves pale, scarcely or not at all revolute, oblong to broadly elliptic-oval, 1.5-5 cm. long, green and rugose above, whitish-puberulent and resinous-granuliferous beneath; petioles 5-10 mm. long; pedicels puberulent and usually glandular; calyx-lobes ciliate and ciliate on the margins; petals white, 5-8 mm. long, oblong; stamens usually 10; filaments hairy below the middle; capsule subglobose, 4-5 mm. in diameter and but little longer.

Wet mountain meadows, Boreal Zones; British Columbia south through the Pacific States in the mountains to the Sierra Nevada, California, east to the Rocky Mountains from Alberta to Wyoming. Type locality: "Central chain of the Rocky Mountains, on the sides of mountains which close up Thornberg's ravine." May-July.

3. *Ledum columbianum* Piper. Coastal Labrador Tea. Fig. 3673.

Ledum columbianum Piper, Contr. U.S. Nat. Herb. 11: 441. 1906.

Erect shrub, seldom over 1 m. high, the branchlets more or less densely puberulent and somewhat glandular. Leaves 3–6 cm. long, elliptic-oblong, but appearing narrower on account of the strongly revolute margins, green and rugose above, more or less whitish beneath with a fine puberulence between the resinous dots; petioles 5–10 mm. long; pedicels densely puberulent and glandular; calyx-lobes ciliate on the margins; petals white, 5–6 mm. long, oblong, obtuse; stamens 5–7, rarely 10; filaments hairy below the middle; capsule oblong, often acutish, 5–6 mm. long, and nearly twice as long as broad.

Sphagnum bogs and swamps in the coastal Canadian and Humid Transition Zones; along the coast and in the lower altitudes of the Coast Ranges of western Washington and Oregon to the Santa Cruz Mountains, California. Type locality: sphagnum bog at Ilwaco, Washington. May–July.

3. RHODODÉNDRON L. Sp. Pl. 392. 1753.

Shrubs or small trees with glabrous, pubescent or glandular twigs. Leaves evergreen or deciduous, usually alternate, entire, pubescent or glabrous. Flowers showy, in terminal or lateral, umbel-like clusters. Calyx saucer-shaped, the lobes persistent, small or in one species larger and foliaceous. Corolla turbinate-campanulate to funnelform, regularly or irregularly 5-lobed. Stamens 5 or 10, slender, elongated and declined; anthers opening by terminal pores. Ovary 5-celled; style elongated, declined. Capsule 5-celled, septically 5-valved; seeds numerous, minute, wing-margined. [Name Greek, meaning rose-tree.]

A genus of about 200 species widely distributed over the northern hemisphere, and most abundant in Asia. Type species, *Rhododendron ferrugineum* L.

Leaves deciduous, not thick and leathery.

Inflorescence lateral; calyx-lobes foliaceous; corolla white, open-campanulate.

Inflorescence terminal; calyx-lobes small not foliaceous; corolla mostly pink, funnelform.

Leaves evergreen, leathery; flowers rose-purple.

1. *R. albiflorum*.

2. *R. occidentale*.

3. *R. macrophyllum*.

1. *Rhododendron albiflorum* Hook. White-flowered Rhododendron. Fig. 3674.

Rhododendron albiflorum Hook. Fl. Bor. Amer. 2: 43. pl. 133. 1834.

Azalea albiflora Kuntze, Rev. Gen. 387. 1891.

Cladothamnus campanulatus Greene, Erythea 3: 65. 1895.

Azalcastrum albiflorum Rydb. Mem. N.Y. Bot. Gard. 1: 297. 1900.

Erect shrub, 1–2 m. high, with slender branches and exfoliating bark. Leaves 2–7 cm. long, thin, deciduous, oblong to broadly elliptic, acutish at apex, narrowed below to a short petiole, loosely rusty-pubescent, entire or wavy-crenate; flowers in 1–3-flowered lateral clusters, in the axils of last year's leaves; pedicels slender, 10–15 mm. long; calyx-lobes oblong, 10 mm. long; corolla creamy-white, open-campanulate, about 2 cm. broad, the lobes similar; capsule 6–7 mm. high.

Mountain slopes near timber line, Hudsonian Zone; Cascade Mountains, British Columbia to Mount Hood, Oregon, also in the Olympic Mountains, Washington, and the Blue Mountains, Oregon; extending eastward to the Rocky Mountains. Type locality: "Alpine woods of the Rocky Mountains." July–Aug.

2. *Rhododendron occidentale* A. Gray. Western Azalea. Fig. 3675.

Azalea californica Torr. & Gray, Journ. Acad. Phila. II. 3: 54. 1855. Not *Rhododendron californicum* Hook.

Azalea occidentalis Torr. & Gray, Pacif. R. Rep. 4: 116. 1857.

Rhododendron occidentale A. Gray, Bot. Calif. 1: 458. 1876.

Rhododendron sonomense Greene, Pittonia 2: 171. 1891.

Rhododendron occidentale var. *paludosum* Jepson, Man. Fl. Pl. Calif. 741. 1925.

Loosely branching shrub, 1–4 m. high, with shredded bark and somewhat glutinous or sometimes short-pubescent twigs. Leaves deciduous, thin and light green, 3–9 cm. long, elliptic to oblong-oblancoate, obtuse or acute, gland-tipped, sparsely pubescent on both surfaces or sometimes glabrous, short-petioled; inflorescence terminal, more or less glandular-pubescent; calyx-lobes ovate to oblong, 4–5 mm. long, ciliate; corolla funnelform, 3.5–5 cm. long, deeply and slightly irregularly lobed, the lobes oblong-lanceolate, white or more or less tinged with pink, the upper lobes often with a yellow splotch; stamens 5, well exerted; ovary densely glandular-pubescent.

Stream banks and moist mountain meadows and flats, Transition Zone; Douglas County, Oregon, south through the Coast Ranges, Siskiyou Mountains and Sierra Nevada to San Diego County, California. Type locality: "Laguna de Santa Rosa," Sonoma County, California. April–Aug.

3. *Rhododendron macrophyllum* D. Don. California Rhododendron. Fig. 3676.

Rhododendron macrophyllum D. Don ex G. Don, Gen. Hist. Pl. 3: 843. 1834.

Rhododendron californicum Hook. Bot. Mag. 81: pl. 4863. 1855.

Shrub or small tree, 2–5 m. high, with glabrous twigs. Leaves evergreen, thick and coriaceous, dark green above, paler beneath, 6–20 cm. long, oblong to elliptic-oblancoate, obtuse at apex, glabrous, narrowed at base to short stout petioles; calyx-lobes short, broader than long;



3666. *Sarcodes sanguinea*
 3667. *Pityopus californica*
 3668. *Pleuricospora fimbriolata*

3669. *Hemitomes congestum*
 3670. *Cladanthamnus pyrolaeiflorus*
 3671. *Ledum groenlandicum*

3672. *Ledum glandulosum*
 3673. *Ledum columbianum*
 3674. *Rhododendron albiflorum*

corolla broadly campanulate, 3-4 cm. long, rose-purple, the lobes broadly obovate, undulate; stamens 10; filaments strongly declined, stout, about 2 cm. long; capsule oblong, ovoid, 15-20 mm. long, rusty-puberulent and glandular.

Ravines and flats, Humid Transition Zone; western British Columbia, south through western Washington and Oregon to the Santa Cruz Mountains, California. Type locality: "northwest coast of America." April-July.

4. *MENZIËSIA* Smith, Pl. Ic. Ined. pl. 56. 1791.

Shrubs with erect or spreading branches. Leaves deciduous, alternate, approximate on the twigs, light green and thin, entire or obscurely toothed, gland-tipped, short-petioled. Flowers in terminal clusters, appearing with the leaves, the pedicels nodding in anthesis, erect in fruit. Calyx saucer-shaped, shallowly 4-lobed or entire. Corolla urceolate to cylindraceous, the lobes 4, very small, rounded. Stamens 8, included; filaments subulate, glabrous or sometimes pubescent at the base; anthers linear, unappendaged, opening by terminal pores. Ovary 4-celled; style included. Capsule mostly ovoid, rather thick-walled, septically 4-valved; seeds numerous, pointed or caudate. [Name in honor of Archibald Menzies, surgeon and naturalist for the Vancouver Expedition.]

A genus of 6 species, besides the following, *M. glabella* A. Gray is in the Rocky Mountains, *M. pilosa* (Michx.) Pers. in the eastern United States, and 3 others are in Japan. Type species, *Menziesia ferruginea* Smith.

1. *Menziesia ferruginea* Smith. Pacific *Menziesia*. Fig. 3677.

Menziesia ferruginea Smith, Pl. Ic. Ined. pl. 56. 1791.

Menziesia globularis Salisb. Parad. Lond. under pl. 44. 1806.

An erect or straggling shrub, 1-2.5 m. high, with loosely shredded bark, the young twigs finely pubescent and more or less glandular-pilose. Leaves oblong to elliptic or obovate, 3-6 cm. long, obscurely crenate-serrate and ciliate on the margins, upper surface appressed-pubescent, the lower surface usually so only on the veins; pedicels glandular-pilose with more or less matted ferruginous hairs; calyx-lobes ciliate; corolla 7-8 mm. long, cylindric-urceolate, yellow tinged with red; filaments glabrous; ovary glabrous or sparsely pubescent; capsule oblong-ellipsoid, 6-7 mm. long; seeds caudate at both ends.

Moist woods, in deep shade, coastal Canadian and Humid Transition Zones; southern Alaska, southward near the coast to Humboldt County, California. May-July.

The form in the Cascade Mountains of Washington and northern Oregon has the pubescence shorter, and appears in that respect intermediate between *M. ferruginea* Smith and *M. glabella* A. Gray.

5. *KALMIÓPSIS* Rehder, Journ. Arnold Arb. 13: 31. 1932.

Low shrub with puberulent twigs, and evergreen foliage. Leaves alternate, entire, glandular-dotted and gland-tipped. Flowers in terminal erect racemes, the pedicels very slender, elongated, arising from the axils of small crowded membranaceous bracts. Calyx 5-parted, the lobes saccate at base. Corolla open-campanulate, 5-lobed, the lobes broadly ovate, obtuse. Stamens 10, scarcely equaling the corolla; filaments slender, ciliate at base; anthers oblong, dehiscent by terminal pores. Ovary 5-celled; style slender, erect, slightly thickened below the capitate obscurely lobed stigma. Capsule subglobose, crustaceous,



3675. *Rhododendron occidentale*

3676. *Rhododendron macrophyllum*

3677. *Menziesia ferruginea*

septicidally 5-valved; seeds ovoid, with a firm reticulate seed-coat. [Name Greek, meaning *Kalmia*-like.]

A monotypic genus of the Siskiyou Mountains, Oregon, a region noted for an unusual number of endemics.

1. *Kalmiopsis Leachiana* (Henderson) Rehder. *Kalmiopsis*. Fig. 3678.

Rhododendron Leachianum Henderson, *Rhodora* 33: 205. 1931.

Kalmiopsis Leachiana Rehder, *Journ. Arnold Arb.* 13: 32. *pl.* 40. 1932.

Rhodothamnus Leachianus Copel. f. *Amer. Midl. Nat.* 30: 565. 1943.

Low shrub, branching from the base, 15–30 cm. high. Leaves elliptic-obovate, 7–18 mm. long, coriaceous, upper surface glabrous, the lower glandular-dotted, lateral veins indistinct; bracts oval, 5–6 mm. long; pedicels slender, 10–15 mm. long; calyx-lobes ovate, 3–4 mm. long, reddish purple, minutely ciliolate; corolla rose-purple, the tube equaling the calyx, lobes rounded, 6 mm. long, minutely glandular on the back; capsule subglobose, 4–5 mm. long.

Mountain slopes, Canadian Zone; Siskiyou Mountains, Curry County, Oregon. May–June.

6. *KÁLMIA* L. *Sp. Pl.* 391. 1753.

Erect branching shrubs with coriaceous evergreen foliage and viscid inflorescence. Leaves alternate, opposite or verticillate, coriaceous, dark green above, pallid beneath, entire and generally more or less revolute. Flowers in terminal or lateral, corymbose or umbellate clusters, with slender elongated pedicels. Calyx 5-parted, the segments imbricated in the bud, usually colored, persistent. Corolla saucer-shaped, the tube saccate with 10 keels running from the sacs to the lobes and sinuses, the lobes broad, rounded at apex. Stamens 10, included: filaments filiform or subulate, usually pubescent, elastically straightening from the corolla-sacs at anthesis; anthers ovoid, opening by terminal pores. Ovary 5-celled; style slender, nearly straight. Capsule globose or subglobose, 5-valved, subtended by the persistent calyx. [Name in honor of Peter Kalm, a pupil of Linnaeus, who traveled in America.]

An American genus of 8 known species; besides the following, 5 others occur in eastern North America and one in Cuba. Type species, *Kalmia latifolia* L.

Leaves oval to oblong-oval, less than twice as long as broad; corolla less than 15 mm. broad.

1. *K. microphylla*.

Leaves linear to oblong-linear, over twice as long as broad; corolla over 15 mm. broad.

2. *K. polifolia occidentalis*.

1. *Kalmia microphýlla* (Hook.) Heller. Small-leaved *Kalmia*. Fig. 3679.

Kalmia glauca γ *microphylla* Hook. *Fl. Bor. Amer.* 2: 41. 1834.

Kalmia microphylla Heller, *Bull. Torrey Club* 25: 581. 1898.

Low, diffusely branched shrub, 10–20 cm. high, with glabrous or puberulent branchlets. Leaves varying from obovate to broadly oblong, usually oval, 1–2 cm. long, flat or nearly so, subsessile, glabrous and dark green above, pale or glaucescent beneath; corymbs terminal, few-flowered; pedicels very slender, mostly 2.5–4 cm. long, glabrous; calyx 5–6.5 mm. wide; corolla rose-purple, 8–12 mm. wide; capsule globose, 5–6 mm. broad, glabrous.

Moist ground, Boreal Zones; British Columbia and Yukon, south to California, Nevada and Colorado. Type locality: swamps in the Rocky Mountains. June–August.

2. *Kalmia polifolia* subsp. *occidentalis* (Small) Abrams. Western Swamp *Kalmia*. Fig. 3680.

Kalmia occidentalis Small, *N. Amer. Fl.* 29: 53. 1914.

Low branching shrub, 10–30 cm. high, with glabrous or puberulent branchlets. Leaves oblong to oblong-lanceolate or oblong-linear, 15–35 mm. long, flat or usually slightly revolute, glabrous, deep green above, glaucescent beneath, subsessile; corymbs terminal, few-flowered; pedicels 2–3.5 cm. long, glabrous; calyx 8–10 mm. wide, the lobes oblong or ovate; corolla rose-purple, 15–20 mm. wide; capsule globose, 5.5–6.5 mm. wide, glabrous.

Swamps, Boreal Zones; Alaska, south to Mount Rainier and western Washington. Type locality: "foothills of Mount Rainier, Washington." May–July. Typical *K. polifolia* Wagnen. (*K. glauca* Ait.) occurs in north-eastern North America.

7. *PHYLLÓDOCE* Salisb. *Parad. Lond. pl.* 36. 1806.

Low depressed, heath-like shrubs. Leaves evergreen, linear, needle-like, alternate and crowded at the ends of the branches. Flowers in umbel-like terminal clusters, arising from persistent herbaceous bracts, long-pedicelled and nodding or suberect. Calyx persistent, 4–6-lobed, usually 5-lobed. Corolla ovoid, urceolate or rotate-campanulate, more or less lobed. Stamens 8–12; filaments slender; anthers unappendaged, opening by oblique apical pores. Ovary usually 5-celled, subglobose. Style filiform, slender. Capsule ovoid or sub-

globose, septicidally 4–6-valved. Seeds numerous, minute, only narrowly winged. [Name Greek, a sea nymph, mentioned by Vergil.]

A circumboreal genus of about 8 species, 3 of which are restricted to North America. Type species, *Phyllo-doce taxifolia* Salisb.

Calyx and corolla glandular-pubescent; corolla yellow, ovoid and constricted at the throat.

1. *P. glanduliflora*.

Calyx and corolla glabrous; corolla pink or rose-purple, campanulate or open-campanulate.

Corolla-lobes one-third the length of the tube or less; stamens not exserted, the filaments only slightly longer than the anthers.

2. *P. empetriformis*.

Corolla-lobes about equaling the tube in length; stamens exserted, the filaments several times longer than the anthers.

3. *P. Breweri*.

1. *Phyllodoce glanduliflora* (Hook.) Coville. Yellow Mountain Heather. Fig. 3681.

Menziesia glanduliflora Hook. Fl. Bor. Amer. 2: 40. 1834.

Bryanthus glanduliflorus A. Gray, Proc. Amer. Acad. 7: 367. 1868.

Phyllodoce glanduliflora Coville, Mazama 1: 196. 1897.

Low matted shrub with rigid erect branches, 2–4 dm. high. Leaves linear, 4–12 mm. long, numerous and crowded, minutely glandular-serrulate; flowers solitary or 3–8 in a cluster; pedicels 1–3 cm. long, glandular-pubescent; calyx-lobes broadly lanceolate, about 3 mm. long, glandular-pubescent, the margins glandular-ciliate; corolla 5–8 mm. long, the tube puberulent, the minute lobes glabrous; stamens included, filaments pubescent, anthers purple; capsule globose, about 3 mm. broad, equaled or slightly exceeded by the persistent calyx-lobes.

Rocky places, near timber line, Arctic and Hudsonian Zones; higher peaks of the Cascade, Olympic and Blue Mountains; extending from Alaska to Crater Lake, Oregon, and eastward to the Rocky Mountains. Type locality: "mountains north of Smoking River, lat. 56°." July–Aug.

2. *Phyllodoce empetriformis* (Smith) D. Don. Pink Mountain Heather. Fig. 3682.

Menziesia empetriformis Smith, Trans. Linn. Soc. 10: 380. 1811.

Menziesia Grahamii Hook. Fl. Bor. Amer. 2: 40. 1834.

Phyllodoce empetriformis D. Don, Edinb. New Phil. Journ. 17: 160. 1834.

Bryanthus empetriformis A. Gray, Proc. Amer. Acad. 7: 367. 1868.

Low much-branched matted shrub with erect branches, 1–5 dm. high. Leaves linear or linear-oblong, crowded on the branches, 6–15 mm. long, obtuse or acutish, minutely glandular-serrulate; flowers few to many; pedicels 12–25 mm. long, puberulent and glandular; calyx-lobes 2.5 mm. long, ciliate on the margins, otherwise glabrous; corolla campanulate, rose-pink, not constricted at the throat, 5–8 mm. long, the lobes 2 mm. long; stamens included, the filaments glabrous, slightly longer than the anthers; capsule globose, 3–4 mm. in diameter, slightly exceeding the enclosing calyx-lobes.

Mountain slopes near timber line, Arctic and Hudsonian Zones; Alaska, south in the Olympic and Cascade Mountains to Mount Shasta, California, east to Alberta and Montana. Type locality: Nootka, Vancouver Island. July–Aug.

3. *Phyllodoce Breweri* (A. Gray) Heller. Purple or Brewer's Mountain Heather. Fig. 3683.

Bryanthus Breweri A. Gray, Proc. Amer. Acad. 7: 367. 1868.

Phyllodoce Breweri Heller, Muhlenbergia 1: 1. 1900.

Cespitose shrub with rigid erect branches, 1–4 dm. high. Leaves linear, 6–20 mm. long, obscurely serrulate; flowers numerous in the clusters; pedicels 1–2 cm. long, puberulent and sparingly glandular; calyx-lobes oblong, obtuse, 3.5–4.5 mm. long, glabrous on the back, finely ciliate on the margins; corolla open-campanulate, deep rose-purple, about 8 mm. broad, the lobes equaling the tube or longer; stamens conspicuously exserted, the filaments glabrous, several times longer than the anthers; style exserted; capsule spherical, 3–3.5 mm. in diameter, equaled or exceeded by the calyx-lobes.

Rocky ledges, Hudsonian Zone; Mount Shasta region, southward through the Sierra Nevada to the San Bernardino Mountains, California. Type locality: Wood's Peak, Eldorado County, California. July–Aug.

8. *CASSIOPE* D. Don, Edinb. New. Phil. Journ. 17: 157. 1834.

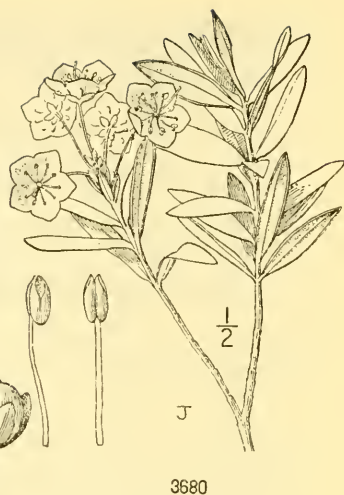
Prostrate or creeping shrubs with ascending branches. Leaves scale-like, closely imbricate and decussately opposite in pairs (4-ranked), evergreen and long-persistent on the branches after dying. Flowers solitary in the axils of the leaves toward the ends of the branches, on slender elongated pedicels, nodding in anthesis. Bractlets 4, subtending the pedicels. Calyx 4–5-lobed, persistent, the lobes exceeding the tube. Corolla campanulate, 4–5-lobed, the lobes much shorter than the tube. Stamens 8 or 10, included; filaments longer than the anthers, glabrous; anthers attached dorsally near the apex, opening by terminal pores, each sac with a dorsal awn-like appendage. Ovary depressed-globose, 4–5-celled; style persistent, stigma minute. Capsule globose to ovoid, 4–5-lobed and loculi-



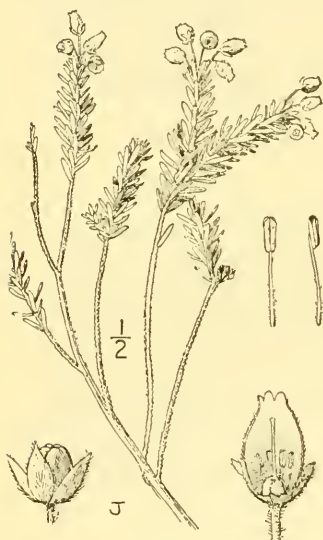
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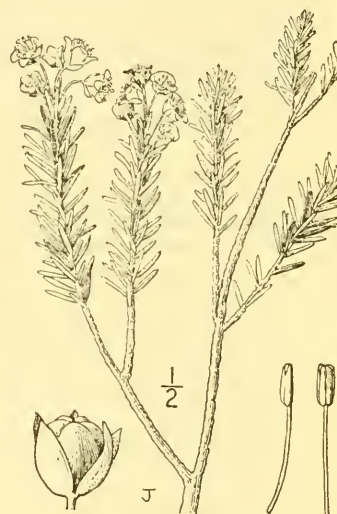
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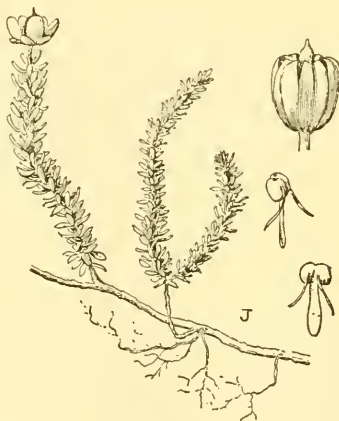
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3678. *Kalmiopsis Leachiana*
 3679. *Kalmia microphylla*
 3680. *Kalmia polifolia*

3681. *Phyllodoce glanduliflora*
 3682. *Phyllodoce empetriformis*
 3683. *Phyllodoce Breweri*

3684. *Cassiope tetragona*
 3685. *Cassiope Mertensiana*
 3686. *Harrimanella Stelleriana*

cidally 4-5-valved; seeds numerous, minute, not winged. [Greek mythology, Cassiope, mother of Andromeda.]

A circumboreal and alpine genus of the northern hemisphere including about 10 known species. Type species, *Andromeda tetragona* L.

Leaves distinctly grooved on the back.

1. *C. tetragona*.

Leaves not grooved, but usually somewhat keeled on the back.

2. *C. Mertensiana*.

1. *Cassiope tetragona* (L.) D. Don. Lapland Cassiope. Fig. 3684.

Andromeda tetragona L. Sp. Pl. 393. 1753.

Cassiope tetragona D. Don, Edinb. New Phil. Journ. 17: 158. 1834.

Low alpine shrub, the branchlets stout, 5-30 cm. high. Leaves oblong-ovoid, 3.5-5.5 mm. long, obtuse or sometimes acutish, puberulent when young, distinctly marked with a longitudinal groove down the back; without a membranous margin or terminal bristle; pedicels 1-3 cm. long, glabrous; calyx-lobes 2-3 mm. long, acute; corolla white, 4-6 mm. long, the lobes ovate; stamens 2 mm. long; capsule globose, about 3 mm. broad, glabrous.

Rocky slopes and tundra, Arctic and Hudsonian Zones; circumboreal, ranging as far south as Labrador and northern Washington, where it has been collected by Lyall on the 49th parallel and by Elmer near Loomis, Okanogan County. Type locality: Lapland. July-Aug.

2. *Cassiope Mertensiana* (Bong.) G. Don. Western Mountain Heather. Fig. 3685.

Andromeda Mertensiana Bong. Mém. Acad. St. Pétersb. VI. 2: 152. 1831.

Cassiope Mertensiana G. Don, Gen. Hist. Pl. 3: 829. 1834.

Andromeda cupressina Hook. Fl. Bor. Amer. 2: 38. 1834.

Low creeping alpine shrub with ascending branches, 1-3 dm. high. Leaves 3-6 mm. long, obtuse at the apex, rounded or slightly keeled on the back, narrowly scarious-margined; pedicels 6-20 mm. long, minutely puberulent; calyx-lobes 2-3.5 mm. long, ovate, obtuse, entire or slightly erose at the apex; stamens 2-2.5 mm. long; capsule subglobose or ovoid, 2.5-3.5 mm. long.

Rock crevices and banks, Arctic-Alpine and Hudsonian Zones; Alaska, south in the Olympic and Cascade Mountains of Washington and Oregon, and the Sierra Nevada, California. Type locality: Sitka, Alaska. July-Aug.

9. *HARRIMANÉLLA* Coville, Proc. Wash. Acad. 3: 570. 1901.

Dwarf shrubs with diffuse branches forming mats or tufts. Leaves alternate, persistent, empetrifoliate, usually crowded on the branchlets, sessile or short-petioled, erose or minutely toothed. Flowers usually solitary and nodding, terminating slender bractless pedicels. Calyx persistent, 5-lobed almost to the base. Corolla campanulate, plaited near the base, the lobes overlapping, as long or longer than the tube. Stamens 10, included; filaments of unequal length, swollen at the base; anthers with a pair of dorsal awns, opening by large terminal pores. Ovary 5-celled, subglobose, seated on a small lobed disk; style short and stout, ovoid or broadly conic, persistent; stigma minute. Capsule globose or ovoid, 5-lobed, loculicidally 5-valved; seeds numerous, slightly or not at all winged, without apical appendages. [Name in honor of Mr. E. H. Harriman, sponsor of the Harriman Alaska Expedition.]

An Arctic genus of 2 species, one in Europe and eastern North America, the other in eastern Asia and western North America. Type species, *Andromeda Stelleriana* Pall.

1. *Harrimanella Stelleriana* (Pall.) Coville. Alaska Moss Heath. Fig. 3686.

Andromeda Stelleriana Pall. Fl. Ross. 1: 58. 1788.

Cassiope Stelleriana DC. Prod. 7: 611. 1839.

Harrimanella Stelleriana Coville, Proc. Wash. Acad. 3: 574. 1901.

Diffuse matted shrub, 10 cm. high or less, resembling *Empetrum* in habit. Leaves 2-4 mm. long, spreading, oblong or narrowly oblong, rounded or acutish at the apex, narrowed at the base to a short decurrent petiole, erose; pedicels little exceeding the leaves in anthesis, twice as long in fruit, pubescent or glabrous; calyx-lobes reddish, 3.5-4 mm. long, oval or oblong; corolla white or tinged with pink, 6-7 mm. long, the lobes longer than the tube; capsule subglobose, 4-5 mm. long.

A characteristic plant near timber line, Arctic-Alpine and Hudsonian Zones; coastal region of Alaska to Mount Rainier, Washington; also in eastern Siberia and northern Japan. Type locality: eastern Siberia. July-Aug.

10. *LEUCÓTHOE* D. Don, Edinb. New Phil. Journ. 17: 159. 1834.

Erect shrubs, usually with flexible stems. Leaves alternate, persistent, entire or toothed, petioled. Flowers perfect, bracteate, in axillary or terminal panicles. Calyx 5-lobed, persistent. Corolla urceolate or tubular, the lobes short. Stamens 10, included; filaments subulate; anthers attached near the base, with 1-2 short awns or mucronations near the apex, dehiscent by terminal pores. Ovary seated on a 10-lobed disk, 5-celled;

style slender, straight; stigma small, capitate or slightly 5-lobed. Capsule depressed-globose, thin-walled, loculicidally 5-valved; seeds numerous, minute. [Leucothe, daughter of Orchamur, King of Babylon, and Eurynome.]

About 35 species, natives of eastern Asia and North and South America. Besides the following, 5 other species inhabit eastern United States. Type species, *Andromeda axillaris* Lam.

1. *Leucothoe Davisiae* Torr. Western Leucothoe. Fig. 3687.

Leucothoe Davisiae Torr. ex A. Gray, Proc. Amer. Acad. 7: 400. 1868.

Leucothoe Cusickii M. E. Jones, Contr. West. Bot. No. 11: 1. 1903.

Oreocallis Davisiae Small, N. Amer. Fl. 29: 58. 1914.

An erect shrub 6–15 dm. high, with rather stout glabrous branchlets. Leaves on short petioles, oblong to oblong-ovate, 3–6 cm. long, obtuse or acutish, serrulate, pale green and coriaceous; panicle terminal, 5–15 cm. long, the branches erect; bractlets scarious, whitish; flowers nodding, articulate with the pedicel; calyx-lobes nearly distinct, thin and whitish; corolla white, 5–6 mm. long; capsule depressed-globose, 5 mm. broad, erect.

Bogs and edges of pools, Canadian Zone; Siskiyou and Cascade Mountains, southern Oregon, to the southern Sierra Nevada, California. Type locality: "Nevada County near Eureka, California." June–July.

11. GAULTHERIA L. Sp. Pl. 395. 1753.

Evergreen shrubs with alternate coriaceous leaves. Flowers solitary in the axils, or racemose or paniculate. Calyx persistent, the lobes longer than the tube and often accrescent. Corolla campanulate, ovoid or urceolate, 5-lobed. Stamens 10, included: the filaments dilated at base and adnate to the base of the corolla-tube; anthers 2-awned, dehiscing by terminal pores. Ovary 5-celled, 5-lobed, seated on a 10-lobed disk; style columnar; stigma entire; ovules numerous. Fruiting calyx accrescent and fleshy, enclosing the capsule. [Name in honor of Dr. Gaultier, of Quebec.]

About 100 species, especially abundant in the Andes, South America, a few are Asiatic. Besides the following, one other, *G. procumbens* L., inhabits the cool-temperate parts of Canada and eastern United States. Type species, *Gaultheria procumbens* L.

Flowers solitary in the upper axils, campanulate; filaments glabrous; dwarf shrubs.

Calyx glabrous; leaves ovate, about 10–15 mm. long.

Calyx pubescent; leaves ovate or subcordate, 20–40 mm. long.

Flowers urceolate, in elongated many-flowered terminal or subterminal racemes; filaments hairy; shrubs, 5–20 dm. high.

1. *G. humifusa*.

2. *G. ovatifolia*.

3. *G. Shallon*.

1. *Gaultheria humifusa* (Graham) Rydb. Alpine Spicy Wintergreen. Fig. 3688.

Vaccinium humifusum Graham, Edinb. New Phil. Journ. 11: 193. 1831.

Gaultheria Myrsinites Hook. Fl. Bor. Amer. 2: 35. 1834.

Gaultheria humifusa Rydb. Mem. N.Y. Bot. Gard. 1: 300. 1900.

Low shrub with creeping stems, the branches mostly less than 10 cm. high, slender, glabrous or puberulent. Leaves oval to round-oval, or rarely ovate-oval, the larger rarely over 15 mm. long, obtuse at apex, obtuse to rounded at base, entire or obscurely serrulate, petioles very short; flowers solitary in the axils, on short bracted peduncles; calyx 2.5–3 mm. long, and nearly as broad, toothed to near the middle, glabrous; corolla slightly exceeding the calyx; anthers without appendages; fruiting calyx enlarged, forming a fleshy berry-like fruit, 5–7 mm. in diameter, scarlet and spicy-flavored.

Moist mossy banks and edges of wet meadows, mainly Hudsonian Zone; British Columbia and Alberta, south to Colorado and California. In the Pacific States it is found in the Olympic and Cascade Mountains, and locally in the Sierra Nevada. Type locality: Canadian Rocky Mountains. Type grown from seeds in the botanic garden at Edinburgh. July–Aug.

2. *Gaultheria ovatifolia* A. Gray. Oregon Spicy Wintergreen. Fig. 3689.

Gaultheria ovatifolia A. Gray, Proc. Amer. Acad. 19: 85. 1883.

Low shrub with procumbent stems and erect or ascending branches, seldom over 15 cm. high, the branchlets, petioles and calyx pubescent with loosely spreading hairs. Leaves ovate to broadly ovate, the larger 20–25 mm. long, acute at apex, abruptly rounded or subcordate at base, distinctly serrulate; flowers solitary in the axils on short bracteate peduncles; calyx 2 mm. long, the lobes exceeding the tube; corolla 3.5 mm. long; berry-like fruit, scarlet, globose, 4–5 mm. in diameter, spicy-flavored.

Coniferous forests, Transition and Canadian Zones; British Columbia south to northern Idaho and the Siskiyou Mountains, California. Type locality: "Cascade Mountains, borders of British Columbia, Washington Territory, and northern Oregon." July–Aug.

3. *Gaultheria Shallon* Pursh. Salal. Fig. 3690.

Gaultheria Shallon Pursh, Fl. Amer. Sept. 284. pl. 12. 1814.

Diffusely branching shrub, 6–20 dm. high, with rather stout branches and glandular-pubescent branchlets. Leaves mostly oval-ovate, varying from oval to suborbicular, 3–10 cm. long, or rarely longer, usually abruptly short-acuminate, rounded or subcordate at base, glabrous at least in age, glossy green above, paler and veiny beneath, serrulate; panicles 7–15 cm. long, their

3687. *Leucothoe Davisiae*3688. *Gaultheria humifusa*3689. *Gaultheria ovatifolia*

branches glandular-pubescent; bracts conspicuous, colored, usually ciliolate; calyx 6-8 mm. broad, the lobes triangular-lanceolate, pubescent; corolla white or pink, urceolate, 8-11 mm. long, the lobes recurved; filaments pubescent; fruit black-purple, 7-8 mm. broad.

Usually in woods, Transition Zones; southern Alaska south, west of the Cascade-Sierra Nevada Divide, to Palomar Mountains, southern California. Type locality: "on the falls of the Columbia [Celilo, Washington] and near the western ocean [mouth of the Columbia]." April-July.

12. *ARBÛTUS* L. Sp. Pl. 395. 1753.

Evergreen trees or shrubs with fissured or smooth and exfoliating bark. Leaves alternate, usually long-petioled, entire or toothed, coriaceous. Flowers perfect, in terminal panicles. Calyx tardily deciduous, 5-lobed. Corolla urceolate, with the tube swollen and much longer than the 5, rounded, spreading or recurved lobes. Stamens 10, included; filaments dilated at the base; anthers each with 2 slender awns. Ovary sessile on the disk, usually 5-celled; style columnar or subulate; stigma capitate; ovules numerous. Fruit a globose or depressed-globose berry, with a rugose or granular surface. [The ancient classical name of the strawberry tree.]

A genus of about 20 species inhabiting southern Asia, the Mediterranean region, and the New World from western North America to Chile. Type species, *Arbutus Unedo* L.

1. *Arbutus Menziesii* Pursh. Madroño. Fig. 3691.

Arbutus Menziesii Pursh, Fl. Amer. Sept. 282. 1814.

Arbutus procera Dougl. ex Lindl. Bot. Reg. 21: pl. 1753. 1836.

Tree 3-40 m. high, with a widely spreading crown; bark exfoliating leaving a smooth polished surface highly colored with varying blends of green, brown, and red, or toward the base of old trees becoming persistent and fissured. Leaves persistent and coriaceous, ovate-elliptic to narrowly elliptic, 5-12 cm. long, entire or serrulate, glabrous or sparsely pubescent when young, dark glossy green above; panicles 5-15 cm. long, the rachis and pedicels pubescent or puberulent; calyx-lobes ovate, slightly over 1 mm. long; corolla pink or white, urceolate, 6-8 mm. long; filaments villous; ovary glabrous; style columnar, 5 mm. long; berry globose to ovoid, 8-12 mm. in diameter, red or orange-red.

Wooded slopes, Transition and Upper Sonoran Zones, but at its best in the Humid Transition Zone; Vancouver Island and western British Columbia southward along the Pacific Slope to the Palomar Mountains, California. Type locality: northwest coast of America. Collected by Dr. Menzies, on the Vancouver Expedition. March-May.

13. *COMAROSTÁPHYLIS* Zucc. Abh. Akad. Munch. 2: 331. 1837.

Erect or spreading shrubs, with exfoliating or persistent and shredded bark. Leaves alternate, persistent, coriaceous, entire or toothed, petioled. Flowers in terminal racemes or panicles, 5-merous or rarely 4-merous. Calyx persistent, the lobes exceeding the tube and reflexed or spreading in age. Corolla urceolate, the lobes short and broad, spreading or recurved. Stamens 10, included; filaments short, subulate, pubescent; anthers 2-horned on the back. Ovary seated on a disk, 5-celled, depressed-globose or ovoid; style

columnar; stigma minute. Fruit fleshy and drupe-like, with a papillose or warty pericarp, and a 5-celled (or fewer by abortion) stone. [Name Greek, meaning *Arbutus* and grape, referring to the *Arbutus*-like plants and the edible fruit.]

An American genus of about 20 species, chiefly natives of Mexico. Type species, *Comarostaphylis arguta* Zucc.

1. *Comarostaphylis diversifolia* (Parry) Greene. California *Comarostaphylis*. Fig. 3692.

Arctostaphylos arguta var. *diversifolia* Parry, Proc. Davenport Acad. 4: 35. 1884.

Arctostaphylos diversifolia Parry ex A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 397. 1886.

Comarostaphylis diversifolia Greene, Bull. Calif. Acad. 2: 406. 1887.

Arborescent shrub, 2-4 m. high, with shredded bark and finely grayish-tomentose branchlets. Leaves elliptic, 3-9 cm. long, rounded, obtuse or rarely acute at apex, narrowed at base, serrulate to serrate-dentate and often revolute on the margin, glabrous or sparsely puberulent on the midvein above, finely tomentose beneath and on the short petiole; racemes usually solitary and terminal, 4-8 cm. long, the rachis and pedicels tomentose; bracts with broad scarious margins; calyx tomentulose, the lobes lanceolate, 2 mm. long, much exceeding the tube, strongly reflexed in fruit; corolla 5-7 mm. long; stamens included, the filaments hairy below the middle; ovary short-pubescent; drupe globose, 4-6 mm. in diameter, granular-rugose, red.

Slopes of canyons, Upper Sonoran Zone; Santa Monica Mountains, California, southward to northern Lower California; also on the adjacent islands. Type locality: Jamul Valley, San Diego County, California. April-May.

14. *XYLOCÓCCUS* Nutt. Trans. Amer. Phil. Soc. II. 8: 358. 1843.

Shrubs with erect branching stems and shreddy bark. Leaves alternate or opposite, persistent, horizontal, entire with revolute margins. Flowers in terminal simple or branching panicles. Bracts small, scale-like. Calyx persistent, deeply 5-lobed or rarely 4-lobed. Corolla urceolate, 5-lobed or rarely 4-lobed, the lobes small, spreading or recurved. Stamens 10 or rarely 8, included; anthers broad, each sac with a slender awn. Ovary 5-celled or rarely 4-celled, seated on a disk, pubescent; style elongate; stigma minute. Fruit a dry drupe, with a smooth pericarp and a thin pulp; nutlets united into a solid stone.

A genus of 2 species, inhabiting southern California and Lower California. Type species, *Xylococcus bicolor* Nutt.

1. *Xylococcus bicolor* Nutt. Mission Manzanita. Fig. 3693.

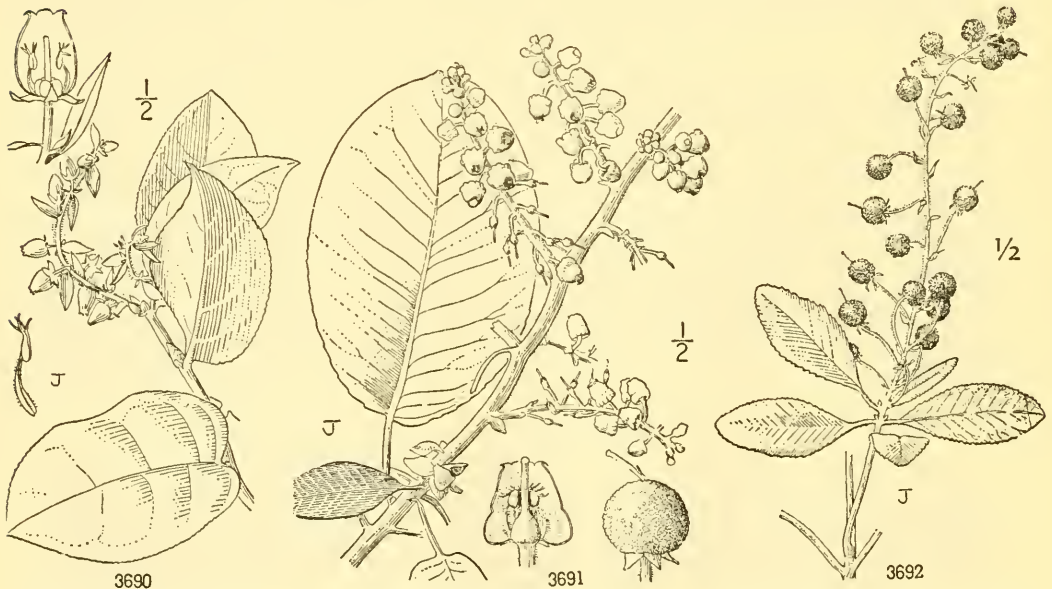
Xylococcus bicolor Nutt. Trans. Amer. Phil. Soc. II. 8: 259. 1843.

Arctostaphylos Veatchii Kell. Proc. Calif. Acad. 2: 19. 1863.

Arctostaphylos bicolor A. Gray, Proc. Amer. Acad. 7: 366. 1868.

Arctostaphylos Clevelandii A. Gray, Syn. Fl. N. Amer. 2¹: 29. 1878.

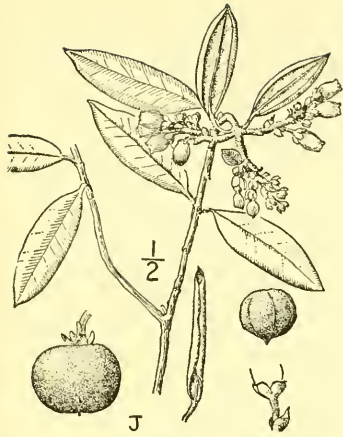
Arborescent shrub, 2-3 dm. high, with the bark persistent and shredded and the branchlets



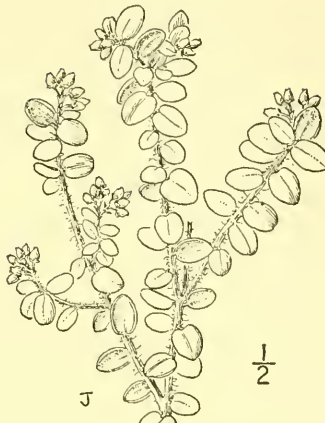
3690. *Gaultheria Shallon*

3691. *Arbutus Menziesii*

3692. *Comarostaphylis diversifolia*



3693



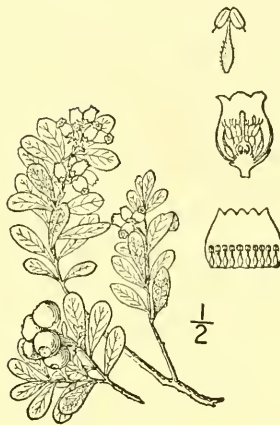
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3693. *Xylococcus bicolor*3694. *Arctostaphylos nummularia*3695. *Arctostaphylos myrtifolia*3696. *Arctostaphylos nissenana*3697. *Arctostaphylos uva-ursi*3698. *Arctostaphylos nevadensis*

cinereous-tomentose. Leaves alternate, horizontal, elliptic to oblong, acutely narrowed at both ends, usually strongly revolute, dark green and glabrous above, densely cinereous-tomentose beneath, short-petioled; flowers in short dense simple or few-branched racemes, with the rachis, bracts and calyx-lobes tomentose; corolla 8-9 mm. long, white or pink; ovary pubescent; fruit globose, 5-7 mm. in diameter, becoming smooth and polished; stone solid and smooth.

Dry hillsides and mesas, Upper Sonoran Zone; Verdugo Hills, Los Angeles County, Catalina Island, and western San Diego County, California, to northern Lower California. Type locality: San Diego, California. Dec.-Feb.

15. ARCTOSTAPHYLOS Adans. Fam. Pl. 2: 165. 1763.

Woody evergreen plants, varying from low spreading shrubs to small trees, with exfoliating bark usually leaving the trunks and older branches polished and red-brown. Leaves alternate, coriaceous, persistent, petioled or sessile, often similar on both surfaces and vertical by a twist of the petiole. Flowers in terminal racemes or panicles, small, nodding on slender pedicels bracteolate at the base and borne in the axils of persistent or deciduous bracts. Calyx persistent, 5-parted, the lobes oblong to orbicular. Corolla urceolate to oblong-campanulate, white or tinged with pink, 5-lobed, the lobes short, rounded, recurved, imbricate in the bud. Stamens 10, included; filaments dilated and usually hairy at the base; anthers with 2 dorsal awns, opening by terminal pores. Ovary 4-10-celled, seated on a 10-lobed disk; ovules solitary in the cavities; style slender. Drupe with 4-10 seed-like nutlets, irregularly separable or united into a solid stone; pericarp thin or often with a granular pulp. [Name Greek, meaning bear and berry. The

name *Uva-ursi*, Latin, also meaning bear and berry, was the original generic name, but the International Rules do not permit the use of two separate words for generic names.]

A genus of about 40 species; one of these, *A. Uva-ursi* (L.) Spreng., is circumboreal, the others inhabit western North America, Mexico and Central America, with the great majority in the Pacific States. Type species, *Arbutus Uva-ursi* L.

Fruit laterally compressed, small, with scanty glandular pulp, splitting open and falling early; nutlets thin-walled; corolla 3-5 mm. long; leaves less than 25 mm. long. (*Schizococcus*)

Flowers 4-merous; leaves thin, cartilaginous, revolute on the margins.

1. *A. Nummularia*.

Flowers 5-merous.

Leaves bright green; older branches smooth and polished.

2. *A. myrtifolia*.

Leaves pale green; older branches with shreddy bark.

3. *A. nissenana*.

Fruit globose or depressed, rarely ellipsoid, not falling early and splitting.

Pericarp with granular pulp; nutlets all separable or irregularly coalescent, or rarely (*A. Parryana*) united into a solid stone.

Leaves rounded at apex, not mucronate, bright green; fruit bright red, insipid; prostrate shrub.

4. *A. Uva-ursi*.

Leaves acute to rounded and mucronate or mucronulate at apex; fruit brown, acid.

Low procumbent or prostrate shrubs, the lower branches rooting; corolla 4-5 mm. long.

Leaves broadest toward the apex.

Prostrate glabrous montane species.

5. *A. nevadensis*.

Low coastal shrub with tomentose foliage and branches.

6. *A. pumila*.

Leaves mostly broadest toward the base; coastal species.

Racemes few, generally simple.

Shrub forming a mound-like mass 5-10 dm. high; fruit shining, 4 mm. broad.

7. *A. Hookeri*.

Shrub procumbent; fruit dull, 8 mm. broad.

8. *A. franciscana*.

Racemes many, the terminal ones compound.

9. *A. densiflora*.

Erect shrubs (sometimes the lower branches spreading and rooting in *A. patula*).

Bracts shorter than the pedicels, mostly triangular or triangular-subulate, not foliaceous.

Pedicels glabrous or rarely puberulent.

Branches of the racemes very slender, the flower-bearing portion not thickened; corolla 5 mm. long (rarely 6 mm. in *A. Stanfordiana*); leaves bright shiny green.

Branchlets glabrous.

10. *A. Stanfordiana*.

Branchlets glandular-hispidulous.

11. *A. hispidula*.

Branches of the racemes stoutish, the flower-bearing portion usually thickened; corolla 6-8 mm. long.

Leaves bright green.

Young twigs and branches of the inflorescence glabrous or glandular not tomentulose.

Ovary and fruit glabrous; twigs and branches of inflorescence resinous-glandular or sparsely glandular-pubescent.

12. *A. patula*.

Ovary and fruit glandular; twigs and branches of inflorescence glabrous.

14. *A. elegans*.

Young twigs and branches of the inflorescence cinereous-tomentulose.

Fruit ellipsoid-globose; nutlets united into a solid stone, prominently ribbed and rugose.

13. *A. Parryana*.

Fruit depressed-globose; nutlets irregularly separable.

Leaves mostly over 20 mm. or more wide.

15. *A. Manzanita*.

Leaves seldom over 15 mm. wide; inflorescence short, usually of a single raceme or rarely two.

Plants not sprouting from the base and therefore fire-killed; bark exfoliating, smooth.

16. *A. pungens*.

Plants sprouting from the root crown, not fire-killed; pedicels puberulent; bark persisting and becoming shreddy.

17. *A. rudis*.

Leaves pale green; twigs and inflorescence glabrous or obscurely puberulent; fruit 12-13 mm. broad.

18. *A. metwukka*.

Pedicels villous, usually glandular.

Leaves bright shiny green, glabrous or nearly so; pedicels sparingly long-hairy.

19. *A. insularis*.

Leaves very pale ashy-green, glabrous or glandular-pubescent; pedicels densely glandular-pubescent.

Bracts short, triangular, persistent; fruit depressed-globose; nutlets separating.

Herbage glabrous except for the glandular-puberulent pedicels.

20. *A. viscida*.

Herbage at least the branchlets and inflorescence glandular-puberulent as well as the pedicels.

21. *A. mariposa*.

Bracts linear-lanceolate, about half as long as the pedicels, thin and mostly early deciduous; fruit ovoid, pubescent; nutlets coalescing.

22. *A. drupacca*.

Bracts of the inflorescence usually foliaceous, about as long or longer than the pedicels, the upper ones sometimes reduced and lanceolate-subulate.

Plants not stump-sprouting, and therefore fire-killed.

Leaves distinctly petiolate.

Bark not exfoliating, but persistent and becoming shreddy.

23. *A. morroensis*.

Bark exfoliating, leaving a smooth polished red-brown surface.

Young branches tomentose or glandular-pubescent, but without long bristly hairs or rarely with a few scattering ones.

Branchlets not glandular-pubescent; inflorescence not glandular.

Leaves green, only thinly tomentulose; fruiting pedicels not recurved.

Bracts lanceolate, the upper reduced and shorter than the pedicels; leaves 2-3.5 cm. long. 24. *A. cinerea*.

Bracts mostly foliaceous, the upper longer than the pedicels; leaves mostly 3-5 cm. long. 29. *A. Tracyi*.

Leaves gray-green and more or less densely white-tomentulose on both sides; fruiting pedicels recurved-spreading.

Ovary densely pubescent; leaves, branchlets and inflorescence more or less densely white-tomentulose.

25. *A. canescens*.

Ovary glabrous or nearly so.

Leaves obtuse or rounded at base.

26. *A. silvicola*.

Leaves truncate or cordate at base.

27. *A. obispoensis*.

Branchlets and the inflorescence glandular-pubescent.

Leaves elliptic to oblong, 1.5-3.5 cm. long.

28. *A. otayensis*.

Leaves narrowly ovate to lanceolate, 3.5-6.5 cm. long.

30. *A. virgata*.

Young branches with long bristly hairs as well as shorter pubescence.

Ovary densely pubescent; fruit not striped.

Pubescence of branches glandular.

30. *A. virgata*.

Pubescence not glandular.

31. *A. columbiana*.

Ovary usually glabrous; fruit usually with blue-black stripes.

32. *A. pilosula*.

Leaves sessile or nearly so, cordate or auriculate-clasping at base.

Bark exfoliating, leaving a smooth red-brown surface.

Pedicels and ovaries pubescent or glandular-hairy.

Branchlets and inflorescence glandular-villous, rarely glabrate.

33. *A. Andersonii*.

Branchlets and inflorescence tomentose and sparsely setose-bristly, not glandular.

34. *A. auriculata*.

Pedicels and ovaries glabrous or essentially so.

36. *A. pechoensis*.

Bark on old stems shreddy; branches dense forming a compact crown.

35. *A. pajaroensis*.

Plants stump-sprouting from an enlarged burl, not fire-killed.

Leaves dull or gray-green, more or less pubescent and about equally stomatiferous on both sides.

Fruit glandular-pubescent; stems several from a much-enlarged burl-like root crown.

37. *A. glandulosa*.

Fruit not glandular; low intricately branched shrub.

38. *A. intricata*.

Leaves darker green, usually shining and with few or no stomata on the upper side, often subcordate at base.

Bark smooth, exfoliating, leaving a smooth red-brown trunk.

Branchlets more or less tomentose and villous-hirsute, not glandular; leaves firm, tomentose beneath or glabrate on both sides.

39. *A. crustacea*.

Branchlets and inflorescence glandular-pubescent or -villous.

40. *A. subcordata*.

Bark more or less persistent and shreddy.

Young branches and inflorescence glandular-villous; pedicels glandular-villous.

41. *A. bracteosa*.

Young branches and inflorescence densely tomentose; pedicels villous, not glandular.

42. *A. tomentosa*.

Pericarp with no granular pulp; fruit large, 12-15 mm. long; nutlets coalesced into a large stone; arborescent shrub with glaucous and normally glabrous foliage.

43. *A. glauca*.

1. *Arctostaphylos Nummularia* A. Gray. Fort Bragg Manzanita. Fig. 3694.

Arctostaphylos Nummularia A. Gray, Proc. Amer. Acad. 7: 366. 1868.

Uva-ursi Nummularia Abrams, N. Amer. Fl. 29: 100. 1914.

Schizococcus Nummularius Eastw. Leaflets West. Bot. 1: 99. 1934.

Schizococcus Nummularius var. *latifolius* Eastw. op. cit. 2: 50. 1937.

Low shrub, seldom over 3-4 dm. high, the branches numerous, mostly prostrate, bark exfoliating becoming smooth and red-brown, branchlets pilose-pubescent. Leaves numerous, elliptic to oblong, or sometimes ovate, 8-15 mm. long, usually subcordate at base, glossy green on both surfaces, glabrous except for pilose hairs on the base of the midvein and the short petiole; flowers in short racemes; bracts triangular, glabrous; pedicels slender, glabrous; flowers 4-merous; calyx-lobes ovate, ciliate on the margins, otherwise glabrous; corolla 4-5 mm. long; ovary densely pubescent; fruit oblong, flattened laterally, 4-6 mm. long, dark brown; nutlets nearly or quite smooth, readily separable, thin-walled.

Barren sandy or rocky slopes, Humid Transition Zone; coastal region of Mendocino and Sonoma Counties, California. Type locality: on the plains near Mendocino City, California. March-April. Glossy-leaved Manzanita.

Arctostaphylos Nummularia var. *sensitiva* (Jepson) McMin, Ill. Man. Calif. Shrubs 389. 1939. (*A. sensitiva* Jepson, Madroño 1: 85. 1923.) Erect shrub 6-15 dm. high. Leaves broadly elliptic to suborbicu-

lar, 12–20 mm. long. Mount Tamalpais and Bolinas Ridge, Marin County, and Santa Cruz Mountains, Santa Cruz County, California. Type locality: Mount Tamalpais.

2. *Arctostaphylos myrtifolia* Parry. Ione or Myrtle-leaved Manzanita. Fig. 3695.

Arctostaphylos myrtifolia Parry, Pittonia 1: 34. 1887.

Uva-ursi myrtifolia Abrams, N. Amer. Fl. 29: 100. 1914.

Arctostaphylos nummularia var. *myrtifolia* Jepson, Madroño 1: 85. 1922.

Schizococcus myrtifolius Eastw. Leaflets West. Bot. 1: 99. 1934.

Low diffusely branching shrub with decumbent or ascending branches, the branchlets glandular-puberulent and setose-hispid with rather short, stiff hairs. Leaves ovate to narrowly elliptic, 5–18 mm. long, obtuse at base, acute and prominently cuspidate at apex, firm-coriaceous, glossy green on both surfaces, glabrous or sparingly short-pubescent, especially toward the base; raceme very short, simple or few-branched; rachis glandular-puberulent, bracts triangular; pedicels glabrous; calyx-lobes ciliate on the margins; corolla 4 mm. long; ovary covered with short stiff hairs; fruit smooth, small; nutlets 3 or 4, scarcely 2 mm. long.

Dry rocky ridges, Upper Sonoran Zone; foothills of the Sierra Nevada, Amador County, California. Type locality: near Ione, California. Jan.–Feb.

3. *Arctostaphylos nissenana* Merriam. Eldorado Manzanita. Fig. 3696.

Arctostaphylos nissenana Merriam, Proc. Biol. Soc. Wash. 31: 102. pl. 4, 5. 1918.

Schizococcus nissenanus Eastw. Leaflets West. Bot. 2: 49. 1937.

Arctostaphylos nissenana var. *arcana* Jepson, Fl. Calif. 3: 39. 1939.

Erect shrub, 1–2 m. high with reddish brown fibrous bark and slender, villous-hirsute branchlets. Leaves oblong to elliptic or some oblong-obovate, 12–20 mm. long, 5–10 mm. wide, acute or obtuse and mucronate at apex, obtuse at base, pale green, puberulent when young, mostly glabrate in age; petioles villous-pubescent, the pubescence usually extending a short distance up the midrib and the margins of the blade; racemes short, about 1 cm. long; lower floral bracts foliaceous, villous, the upper reduced, reddish, scarcely equaling the glabrous pedicels; corolla pink, barely 5 mm. long; ovary pubescent; fruit oblong or oblong-obovoid, thinly pilose or glabrate, the exocarp thin; nutlets usually 5, separating soon after maturity.

Rocky ridges, Upper Sonoran and lower border of Arid Transition Zones; western slopes of the Sierra Nevada in the vicinity of Placerville, Eldorado County, California. Type locality: Eldorado County. "Collected 2 or 3 miles north of Louisville, Eldorado County, Calif. (SW of American Flat and near top of a low ridge, alt. 2,300–2,400 ft.)." Jan.–March.

4. *Arctostaphylos Ūva-ŭrsi* (L.) Spreng. Red Bearberry or Kinnikinnick. Fig. 3697.

Arbutus Ūva-ursi L. Sp. Pl. 395. 1753.

Arctostaphylos Ūva-ursi Spreng. Syst. 2: 287. 1825.

Uva-ursi procumbens Moench, Meth. 470. 1794.

Uva-ursi Ūva-ursi Britt. in Britt. & Brown, Ill. Fl. ed. 2: 2: 693. 1913.

Prostrate shrub with rooting branches 2–5 dm. long, tardily exfoliating red-brown bark and glabrous or sparsely tomentulose branchlets. Leaves spatulate to obovate, 1.5–2 cm. long, rounded or emarginate at apex, not at all mucronate, thin-coriaceous, bright green and glabrous above, paler beneath; petioles 2–3 mm. long; flowers in short, few-flowered racemes; rachis sparsely tomentose; bracts triangular, 2 mm. long, persistent; pedicels 3–4 mm. long, glabrous; corolla 4–6 mm. long, white or tinged with pink; ovary glabrous; fruit bright red, with a bitter astringent pulp; nutlets separable.

Of various habitats, ranging from seashore sand dunes to alpine slopes above timber line, Transition and Boreal Zones; Arctic America south to Virginia, Illinois, New Mexico, and California; also Eurasia. In the Pacific States it is common in both western and eastern Washington, western Oregon and the Blue Mountains, but in California it is found only along the northern coast to Marin County. Type locality: northern Europe. March–June. Sandberry.

Arctostaphylos media Greene, Pittonia 2: 171. 1891. Low shrub, the main branches procumbent. Leaves obovate-cuneiform, 2–3 cm. long, puberulent beneath; racemes short, few-flowered; pedicels glabrous; fruit slightly depressed; nutlets consolidated. In all probability this is a hybrid between *A. Ūva-ursi* and *A. columbiana*. It is found associated with these two species in western Washington. Type locality: dry gravelly ground, Mason County, Washington.

Other hybrids arising from *A. Ūva-ursi* and other local forms have been reported as occurring on the northern California coast by J. E. Adams. (Journ. E. Mitchell Sci. Soc. 56: 16. 1940.)

5. *Arctostaphylos nevadensis* A. Gray. Pinemat Manzanita. Fig. 3698.

Arctostaphylos nevadensis A. Gray, Syn. Fl. N. Amer. 2: 27. 1878.

Uva-ursi nevadensis Abrams, N. Amer. Fl. 29: 94. 1914.

Depressed shrub with decumbent branches 3–6 dm. long, forming mats, old branches polished red-brown, young twigs more or less tomentose. Leaves ovate to oblanceolate, commonly narrowly obovate, 1.5–2.5 cm. long, rounded to acutish and prominently mucronate at the apex, bright green on both surfaces, glabrous or somewhat puberulent; flowers in short simple or few-branched racemes; bracts abruptly acuminate above the base, 3 mm. long; pedicels glabrous; flowers usually white; corolla 7–8 mm. long; ovary glabrous; fruit depressed-globose, with copious acid pulp; nutlets separable, rugose.

Rocky mountain slopes, mainly Canadian Zone; Cascade Mountains, Washington, south to the Sierra Nevada, California. Type locality: Sierra Nevada, California, at elevations of 8,000 to 10,000 ft. June.

6. *Arctostaphylos pumila* Nutt. Dune or Sandmat Manzanita. Fig. 3699.

Arctostaphylos pumila Nutt. Trans. Amer. Phil. Soc. II. 8: 267. 1843.
Daphnidostaphylis pumila Klotzsch, Linnaea 24: 267. 1851.
Uva-ursi pumila Abrams, N. Amer. Fl. 29: 100. 1914.

Spreading shrubs forming mat-like clumps, with the center seldom over 6-10 dm. high, the branches assurgent, bark red-brown, branchlets slightly glandular and canescent with a fine tomentum. Leaves numerous, narrowly obovate to spatulate, rarely elliptic, 1-2 cm. long, rounded to acute and conspicuously mucronate at the apex, dull green above, distinctly paler beneath, tomentose when young and often permanently so on the lower surface; petioles 2-3 mm. long; flowers in short congested simple or few-branched racemes; bracts lanceolate-acuminate, tomentose, 2-4 mm. long; pedicels slender, 3 mm. long, glandular-pubescent; calyx-lobes ciliate on the margins; corolla pink, 4 mm. long; ovary pubescent; fruit slightly depressed-globose, light brown, nearly glabrous; nutlets readily separable, carinate on the back, otherwise smooth.

Sandy soils, near the coast, mainly Upper Sonoran Zone; Monterey County, California; especially common on the Monterey Peninsula, where it was originally collected by Nuttall. Feb.-April.

7. *Arctostaphylos Hookeri* G. Don. Hooker's Manzanita. Fig. 3700.

Arctostaphylos Hookeri G. Don, Gen. Hist. Pl. 3: 836. 1834.
Andromeda venulosa DC. Prod. 7: 607. 1839.
Arctostaphylos acuta Nutt. Trans. Amer. Phil. Soc. II. 8: 267. 1843.
Daphnidostaphylis Hookeri Klotzsch, Linnaea 24: 80. 1851.

Low spreading mound-like shrub, branching from the base, the outer branches decumbent, the inner 4-12 dm. high, with smooth dark red-brown bark and tomentose branchlets. Leaves ovate to obovate, 1-2.5 cm. long, bright green on both surfaces, or slightly cinereous when young, usually acute, prominently reticulate-veined; petioles slender, 3-5 mm. long; flowers in short subcapitate racemes; rachis and the short triangular bracts tomentose; pedicels 3-4 mm. long, glabrous; corolla usually tinged with pink, 4-5 mm. long; ovary glabrous; fruit depressed-globose, about 4 mm. broad; nutlets irregularly coalescent, rounded on the back, ribbed and rugosely roughened.

Hillsides and open pine woods, Upper Sonoran and Transition Zones; Monterey County, California, from the Pajaro Hills to San Simeon Bay. Common on the Monterey Peninsula. Type locality: Monterey. Feb.-April.

8. *Arctostaphylos franciscana* Eastw. San Francisco Manzanita. Fig. 3701.

Arctostaphylos franciscana Eastw. Bull. Torrey Club 32: 201. 1905.
Uva-ursi franciscana Heller, Cat. N. Amer. Pl. ed. 3. 276. 1914.

Low procumbent shrubs, the prostrate branches rooting, the stems smooth, young twigs minutely puberulent. Leaves bright green, narrowly to broadly elliptic, sharply acute, 1-2 cm. long; racemes simple, 1-2 cm. long; bracts small, triangular or triangular-subulate; pedicels glabrous; corolla white, 6-7 mm. long; fruit depressed-globose, 7 mm. broad, surface dull; stones mostly separable.

Serpentine outcrops, Humid Transition Zone; San Francisco Peninsula, California. Type locality: San Francisco. Jan.-April.

9. *Arctostaphylos densiflora* M. S. Baker. Sonoma Manzanita. Fig. 3702.

Arctostaphylos densiflora M. S. Baker, Leaflets West. Bot. 1: 31. 1932.

Low procumbent shrubs, the branches rooting freely, minutely tomentulose on the young branchlets, petioles, base of leaves, rachis of raceme and bracts. Leaves when mature bright green and shiny, broadly elliptic, rounded or acutish at apex, obtuse or cuneate at base, mostly 2-3 cm. long; racemes abundant, those terminating the flowering branchlets compound, the lateral ones usually single; bracts small, triangular-subulate; pedicels glabrous, slender; corolla 5 mm. long, white or tinged with pink; fruit depressed-globose, about 6 mm. in diameter, glabrous.

Growing on banks, Humid Transition Zone; western Sonoma County, California. Type locality: near Vine Hill Schoolhouse, Sonoma County. March-April.

10. *Arctostaphylos Stanfordiana* Parry. Stanford's Manzanita. Fig. 3703.

Arctostaphylos Stanfordiana Parry, Bull. Calif. Acad. 2: 493. 1887.
Uva-ursi Stanfordiana Heller, Muhlenbergia 9: 68. 1913.

An erect, much-branched shrub, 1-2 m. high, the bark smooth, bright red-brown, the branchlets slender, glabrous or sometimes puberulent when young. Leaves narrowly ovate to oblanceolate, 2.5-4 cm. long, obtuse to acute and mucronate at the apex, bright green, glabrous and shining; flowers in loose drooping panicles, the branches of the panicles very slender, glabrous or sparingly puberulent; bracts subulate, mostly less than 2 mm. long; corolla usually pink, 5-6 mm. long; ovary glabrous; fruit yellowish brown, somewhat depressed-globose; nutlets broader than long, usually 2 or more coalescent.

Mountain slopes, Upper Sonoran Zone; Coast Ranges, from Mendocino County to Contra Costa County, California. Type locality: mountain slopes in the vicinity of Calistoga, Napa County. Feb.-April.

Arctostaphylos laevigata Eastw. Leaflets West. Bot. 1: 76. 1933. Low intricately branched shrub, old stems smooth dark red-brown, young twigs, petioles and branches of the inflorescence minutely puberulent.

Leaves glossy green, glabrous or nearly so, oblong to lanceolate, 2-3 cm. long, 1-2 cm. wide, generally acute at both ends; panicles drooping, usually of several branches, these not perceptibly thickened above; bracts small, shorter than the glabrous pedicels; corolla white, 4-6 mm. long; fruit depressed-globose, 5-8 mm. in diameter, dark brown and glossy; stones usually 3, about 3 mm. long. Mountain slopes, Upper Sonoran Zone; Mount Diablo, the type locality, Contra Costa County, and Mount St. Helena, Lake County, California.

11. *Arctostaphylos hispídula* Howell. Howell's Manzanita. Fig. 3704.

Arctostaphylos hispídula Howell, Fl. N.W. Amer. 415. 1901.

Uva-ursi hispídula Heller, Muhlenbergia 9: 68. 1913.

Arctostaphylos viscosissima M. E. Peck, Torreya 32: 151. 1932.

Arctostaphylos Stanfordiana subsp. *hispídula* J. E. Adams, Journ. E. Mitchell Sci. Soc. 56: 19. 1940.

Erect shrub with rather strict branches, 5-20 dm. high, old stems very dark colored, young branchlets glandular-hispidulous. Leaves oblong-lanceolate to oblong-ovate, 2.5-3.5 cm. long, acute, usually sharply so at apex, acute or acutish at base, bright glossy green on both surfaces; panicle usually ample, the branches rather slender, glandular-hispidulous, bracts triangular-subulate, 1-2 mm. long; pedicels very slender, 3-5 mm. long, glabrous; corolla pink, about 5 mm. long; ovary glabrous; fruit subglobose.

Rocky ridges or gravelly soils, Humid Transition Zone; Coast Ranges, Curry County, and Siskiyou Mountains, Oregon, to Humboldt County, California. Type locality: bottom lands along Smith River at Gasquet, Del Norte County, California. March-April.

Arctostaphylos Bakeri Eastw. Leaflets West. Bot. 1: 115. 1934. (*A. Stanfordiana* subsp. *Bakeri* J. E. Adams, Journ. E. Mitchell Sci. Soc. 56: 14. 1940.) Essentially like *A. hispídula* in vegetative characters but flowers a little larger, slightly over 5 mm. long. Serpentine ridges, Sonoma County. Type locality: two miles east of Occidental, Sonoma County, California.

12. *Arctostaphylos pátula* Greene. Green-leaved Manzanita. Fig. 3705.

Arctostaphylos pungens var. *platyphylla* A. Gray, Syn. Fl. N. Amer. 2: 28. 1878.

Arctostaphylos patula Greene, Pittonia 2: 171. 1891.

Arctostaphylos obtusifolia Piper, Bull. Torrey Club 29: 642. 1902.

Uva-ursi patula Abrams, N. Amer. Fl. 29: 96. 1914.

Arctostaphylos Parryana var. *pinctorum* (Rollins) Wiesl. & Schr. Madroño 5: 46. 1939, as to the California plant.

Shrub with spreading, rigid and very crooked branches, 1-2 m. high; usually 2-3 stems from a rounded crown, bark smooth and bright red-brown; branchlets resinous-glandular to glandular-pubescent, the glands often golden. Leaves ovate to suborbicular, obtuse or rounded at the apex, bright yellowish green, not at all glaucous, glabrous or resinous-glandular toward the base; flowers in rather ample panicles; rachis and bracts resinous-glandular to glandular-pubescent; bracts broadly triangular at the base, abruptly subulate at the apex, 3-7 mm. long, firm, and widely spreading or reflexed in fruit, glabrous; pedicels glabrous, 5-7 mm. long in fruit; corolla 6.5-7.5 mm. long, white tinged with pink; ovary glabrous; fruit depressed-globose, 7-10 mm. broad, chestnut-brown; nutlets irregularly coalescent, rounded on the back and inconspicuously ribbed, otherwise nearly smooth.

Open pine forests, Arid Transition Zone; southern Washington southward, mainly in the Cascade Mountains and the Sierra Nevada to the mountains of southern California and Lower California, and eastward to Utah. Plants having scattered glandular hairs on the branches occasionally occur, more or less throughout the range, but in Washington and Oregon (*A. obtusifolia* Piper) they are the common form. At higher altitudes often low and spreading. Type locality: pine woods at middle elevations in the Sierra Nevada, California. March-May.

Arctostaphylos acutifolia Eastw. Leaflets West. Bot. 3: 125. 1942. Low shrub 5-6 dm. high, young branchlets glandular-villous, bark soon exfoliating leaving the older branches smooth and polished. Leaves narrowly to broadly oblong, acute, 2.5-3.5 cm. long, glossy green and glabrous; petioles and sometimes the base of the leaf-blades glandular-pubescent; bracts triangular-acuminate, much shorter than the pedicels, these slender, rather sparsely glandular-villous; corolla 5 mm. long; ovary and fruit glandular with rather prominent sessile or subsessile glands. This interesting plant is known only from the original collections made from a single plant found in open coniferous forest on "Long Spring Ridge between Government Flat and Long Spring, Tehama County, California."

13. *Arctostaphylos Parryana* Lemmon. Parry's Manzanita. Fig. 3706.

Arctostaphylos Parryana Lemmon, Pittonia 2: 68. 1890.

Uva-ursi Parryana Abrams, Bull. N.Y. Bot. Gard. 6: 432. 1910.

An erect much-branched shrub, 1.5-2.5 m. high, with smooth dark red-brown bark and hoary tomentose branchlets. Leaves ovate to suborbicular, mostly 2.5-3.5 cm. long, obtuse or rounded and prominently apiculate at apex, tomentulose when young, becoming rather bright green and glabrous on both surfaces; flowers in few-branched or rarely simple racemes; rachis tomentose; bracts triangular, tomentose, the upper half thin and more or less deciduous; pedicels 5-7 mm. long, glabrous; flowers 6-7 mm. long; fruit ovoid, 10-15 mm. long, chestnut-brown, the pulp thin; nutlets united into a solid 5-celled ellipsoid stone, prominently ribbed and rugosely roughened in the intervals.

Dry mountain slopes, Upper Sonoran Zone; southern Sierra Nevada and the Mount Pinos region south to the eastern slopes of the San Gabriel and San Antonio Mountains, southern California. Type locality: Tehachapi Mountains, four miles west of Keene Station, California. March.

14. *Arctostaphylos élegans* Jepson. Konacti Manzanita. Fig. 3707.

Arctostaphylos elegans Jepson, Erythra 1: 15. 1893.

Uva-ursi elegans Heller, Cat. N. Amer. Pl. ed. 3. 276. 1914.

Arctostaphylos Manzanita var. *elegans* L. Benson, Amer. Journ. Bot. 27: 189. 1940.

Arborescent shrub, 1-2 m. high, branches smooth and polished, young twigs glabrous.



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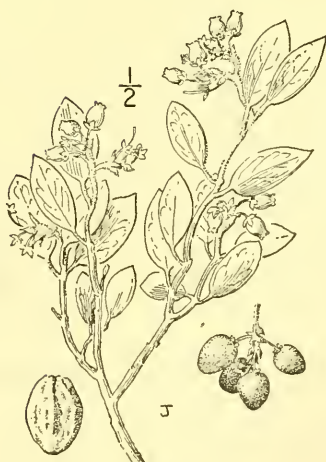
3703



3704



3705



3706



3707

3699. *Arctostaphylos pumila*
 3700. *Arctostaphylos Hookeri*
 3701. *Arctostaphylos franciscana*

3702. *Arctostaphylos densiflora*
 3703. *Arctostaphylos Stanfordiana*
 3704. *Arctostaphylos hispidula*

3705. *Arctostaphylos patula*
 3706. *Arctostaphylos Parryana*
 3707. *Arctostaphylos elegans*

Leaves narrowly to broadly elliptic, rounded or acutish at apex, 2.5–6 cm. long, bright green, thick, glabrous; panicle ample, the branches puberulent; bracts triangular, 3 mm. long; pedicels glabrous; corolla 7–8 mm. long, white; fruit depressed-globose, viscid with a short glandular puberulence, about 10–12 mm. broad, the pulp very thin or none; stones irregularly separable.

Mountain slopes, Upper Sonoran and Arid Transition Zones; Inner Coast Ranges, Lake and Napa Counties, California. Type locality: "covering the undulating obsidian slopes south of Uncle Sam Mountain," Lake County, California. March–May.

15. *Arctostaphylos Manzanita* Parry. Common Manzanita. Fig. 3708.

Arctostaphylos Manzanita Parry, Bull. Calif. Acad. 2: 491. 1887.

Uva-ursi Manzanita Heller, Muhlenbergia 9: 68. 1913.

An erect bushy or arborescent shrub, 2–4 m. high, with smooth dark red-brown bark and puberulent or nearly glabrous branchlets. Leaves ovate to suborbicular or broadly obovate, 2.5–4.5 cm. long, obtuse or rounded, mucronate, dull green with a bloom, sparingly puberulent when young, becoming glabrous, firm-coriaceous; flowers in more or less ample panicles, rachis hoary-tomentose to nearly glabrous; flowers 7–8 mm. long, pale pink or white; ovary glabrous; fruit slightly depressed-globose, 8–12 mm. broad; nutlets irregularly coalescent, carinate on the back and rugose.

Mountain slopes and hillsides, Upper Sonoran Zone; North Coast Ranges and western slopes of the northern Sierra Nevada, California. Type locality: "lower foothills of the Coast Ranges north of San Francisco." Jan.–March.

16. *Arctostaphylos pungens* H. B. K. Mexican Manzanita. Fig. 3709.

Arctostaphylos pungens H. B. K. Nov. Gen. & Sp. 3: 278. 1819.

Daphnidostaphylis pungens Klotzsch, Linnaea 24: 80. 1851.

Arctostaphylos montana Eastw. Proc. Calif. Acad. III. 1: 83. 1897.

Uva-ursi pungens Abrams, Bull. N.Y. Bot. Gard. 6: 432. 1910.

An erect shrub, branching from the base, with smooth red-brown bark, the branchlets more or less cinereous with a fine tomentum. Leaves ovate to broadly lanceolate, or obovate to oblanceolate, 1.5–3 cm. long, cinereous-tomentulose when young, becoming glabrous and dull green or somewhat shining in age; racemes short, spike-like, simple or with 1 or 2 short branches; bracts triangular, 3 mm. long, tomentose throughout; pedicels 5–7 mm. long, glabrous; corolla 7 mm. long; ovary glabrous; fruit depressed-globose, 5–8 mm. broad, chestnut-brown; nutlets separable or irregularly coalescent, carinate and prominently corrugately roughened.

Mountain slopes, Upper Sonoran Zone; Marin and San Benito Counties, California, south in scattered localities to the mountains of southern California; also in Utah, southward through the Mexican Plateau region to the mountains of Oaxaca. Type locality: on mountain slopes near the city of Mexico. Feb.–March.

17. *Arctostaphylos rûdis* Jeps. & Wiesel. Shagbark Manzanita. Fig. 3710.

Arctostaphylos rudis Jeps. & Wiesel. ex. Jepson, Erythea 8: 100. 1938.

Shrub 7–15 dm. high, branching from the usually enlarged burl-like base, bark persistent and shreddy, young branchlets viscid-tomentulose. Leaves plane, bright green and glabrous, elliptic, or a few slightly ovate or even obovate, 2–3 cm. long, rounded or acutish at apex, rounded or obtuse at base; petioles 4–5 mm. long, tomentulose; inflorescence short, with 1–2 short racemes with slightly thickened rachis; bracts triangular-lanceolate, shorter than the glabrous fruiting pedicels; corolla pinkish, 6–7 mm. long; ovary glabrous; fruit slightly depressed-globose, reddish brown, about 7 mm. broad.

Sandy soil, Upper Sonoran Zone; near the coast from Oceano, San Luis Obispo County to near Lompoc, Santa Barbara County, California. Type locality: Corralillos Canyon, Santa Barbara County, California. Nov.–Feb.

18. *Arctostaphylos mewûkka* Merriam. Indian Manzanita. Fig. 3711.

Arctostaphylos mewukka Merriam, Proc. Biol. Soc. Wash. 31: 101. 1918.

Arctostaphylos pastillosa Jepson, Madroño 1: 83, 93. 1922.

Arborescent shrub, 1.5–2 m. high, with smooth polished branches and glabrous twigs. Leaves pale grayish green, elliptic to elliptic-ovate, 2.5–5 cm. long, glabrous; racemes paniculately branched or rarely simple; bracts triangular-subulate, 4–5 mm. long; pedicels glabrous; sepals smooth on the margins; corolla 6–7 mm. long, white or pink; fruit depressed-globose, smooth, dark brown, 12–15 mm. broad; nutlets irregularly separable.

Open pine forests and chaparral slopes, Arid Transition Zone; western slopes of the Sierra Nevada, Butte County to Tulare County, California. Type locality: three miles above Colfax on ridge between North Fork, American River, and Bear River. Feb.–April. According to Dr. C. H. Merriam, "the Mu-wa Indians of Yosemite call this species *Muk-ka*."

19. *Arctostaphylos insularis* Greene. Island Manzanita. Fig. 3712.

Arctostaphylos insularis Greene ex. Parry, Bull. Calif. Acad. 2: 494. 1887.

Uva-ursi insularis Heller, Muhlenbergia 9: 68. 1913.

A symmetrically much-branched shrub, 1–2 m. high, root crown not enlarged and not sprouting after fire; bark smooth, red-brown, young branchlets pale green, glabrous. Leaves ovate, mostly 3–4 cm. long, narrowed at base to the petioles, glabrous, bright green and shining on both surfaces, stomata only on the lower edge; flowers in open panicles; rachis puberulent; bracts short and triangular or those near the base foliaceous, glabrous; pedicels glandular-hairy;

corolla white; fruit light brown, slightly depressed, 6–8 mm. broad; nutlets irregularly coalescent.

Rocky hillsides, Upper Sonoran Zone; Santa Cruz Island, southern California. Type locality: Santa Cruz Island, the definite station not given, but according to Miss Eastwood (Leaflets West. Bot. 1: 62.) "Dr. Greene collected both forms, the pubescent one in the Herbarium of the California Academy of Sciences, the glabrous one in Parry's Herbarium at the State College of Iowa." March.

Arctostaphylos insularis var. *pubescens* Eastw. Leaflets West. Bot. 1: 62. 1933. Young branchlets and rachis of the inflorescence, glandular-hirsute; otherwise like the typical species. Santa Cruz Island.

20. *Arctostaphylos viscida* Parry. White-leaved Manzanita. Fig. 3713.

Arctostaphylos viscida Parry, Bull. Calif. Acad. 2: 492. 1887.

Uva-ursi viscida Heller, Muhlenbergia 9: 68. 1913.

Erect branching shrub forming a rounded compact bush 2–3 m. high, with smooth dark red-brown bark and pale glaucous-green, glabrous or rarely slightly tomentose twigs. Leaves suborbicular to oblong, usually ovate, 2.5–4 cm. long, rounded to acutish and mucronate at apex, cordate to acute at base, very pale glaucous-green and glabrous, firm-coriaceous; petioles 8–12 mm. long; panicles open, its branches glabrous; bracts 2–3 mm. long, triangular-acuminate; pedicels slender, 10–12 mm. long, villous-glandular and viscid; calyx-lobes somewhat ciliate; corolla light pink; ovary glabrous; fruit depressed-globose, 6–8 mm. broad, light brown; nutlets 4–5, carinate and roughened on the back.

Dry hillsides, usually in gravelly or stony ground, Upper Sonoran Zone; Jackson and Josephine Counties, southern Oregon south to the inner foothills of the northern Coast Ranges and the southern Sierra Nevada, California. Type locality: foothills of the Sierra Nevada. March–April.

Arctostaphylos pulchella Howell, Fl. N.W. Amer. 416. 1901. Aborescent shrub, 2–4 mm. high, old branches polished and dark brown, young twigs minutely pubescent. Leaves broadly ovate to oblong, obtuse, pale gray-green and smooth; bracts acuminate-ovate, minutely pubescent; pedicels much longer than the bracts, sparingly glandular; ovary glabrous. Mountain slopes, Arid Transition Zone; Siskiyou Mountains, Josephine and Jackson Counties, Oregon. Type locality: west of Andersons, Josephine County.

21. *Arctostaphylos mariposa* Dudley. Mariposa Manzanita. Fig. 3714.

Arctostaphylos mariposa Dudley in Eastw. Sierra Club Publ. No. 27:52. 1902.

Uva-ursi mariposa Abrams, N. Amer. Fl. 29: 99. 1914.

An erect arborescent shrub of the general habit of the preceding species; branchlets glandular-villous or -pubescent. Leaves suborbicular to narrowly ovate, very pale gray-green, scabrous, otherwise glabrous or glandular-pubescent or -villous; pedicels slender, glandular-villous; calyx-lobes glandular-villous; ovary glandular-pubescent; fruit depressed-globose, glandular, light brown.

Dry hillsides, Upper Sonoran Zone; common in the foothills and lower edges of the yellow pine belt of the Sierra Nevada, California. Type locality: Millwood and Kings River canyons, southern Sierra Nevada, California. March–April.

Arctostaphylos mariposa var. *bivisum* Jepson. Madroño 1: 79. 1922. (*A. Jepsonii* Eastw. Leaflets West. Bot. 1: 119. 1934.) Leaves bright glossy green; pedicels and branchlets sparsely glandular-pubescent. Locally distributed near Wawona and Hetch-Hetchy, Mariposa County, California. Possibly a hybrid between *A. mariposa* Dudley and *A. patula* Greene.

22. *Arctostaphylos drupacea* (Parry) J. F. Macbride. Cuyamaca Manzanita. Fig. 3715.

Arctostaphylos Pringlei var. *drupacea* Parry, Bull. Calif. Acad. 2: 495. 1887.

Uva-ursi drupacea Abrams, Bull. N.Y. Bot. Gard. 6: 434. 1910.

Arctostaphylos drupacea J. F. Macbride, Contr. Gray Herb. No. 53: 16. 1918.

Erect compactly branched shrub, 1–2 m. high, with smooth dull red-brown bark and densely glandular-villous branchlets. Leaves broadly ovate to narrowly obovate, rounded to acute at apex, obtuse to cordate at base, 2.5–4 cm. long, pale gray-green, scabrous, more or less glandular-villous at the base and on the margins, midvein prominent; petioles glandular-villous; bracts membranous, deciduous, pinkish, 5–6 mm. long, glandular-villous; pedicels slender, 10–15 mm. long, glandular-villous; calyx-lobes lanceolate, 3 mm. long, glandular-villous, ciliate on the margins; fruit ovoid, glandular-villous; nutlets united into a solid ellipsoid stone, carinately ribbed and rugose in the intervals, sharply pointed at both ends.

Coniferous forests, Arid Transition Zone; San Bernardino Mountains, southern California to northern Lower California. Type locality: Cuyamaca Mountains, San Diego County, California. March–April.

23. *Arctostaphylos morroensis* Wiesel. & Schr. Morro Manzanita. Fig. 3716.

Arctostaphylos morroensis Wiesel. & Schr. Madroño 5: 42. fig. 2a. 1939.

Shrub 1.5–2 m. high with grayish green foliage and rough shreddy bark, branchlets densely appressed-tomentulose and usually rather sparsely hirsute-bristly. Leaves 1.5–3 cm. long, oblong to oblong-ovate, usually truncate at base varying from subcordate to rounded, rounded to acutish at apex, minutely apiculate, densely tomentulose beneath, less so or rarely glabrous above; petioles 3–4 mm. long, tomentose and hirsute-bristly; inflorescence compact, usually shorter than the leaves; bracts foliaceous, oblong-lanceolate or the lowest oblanceolate, densely tomentose on both sides and bristly-ciliate on the margins; pedicels glabrous; corolla white or pinkish, 5–7 mm. long; ovary densely tomentose; fruit slightly depressed-globose, yellowish brown, about 10 mm. broad; nutlets separating.

Sandy hills near the coast, Upper Sonoran Zone; vicinity of Morro Bay, San Luis Obispo County, California. Type locality: Hazard Canyon, south of Morro Bay. Jan.–March.



3708



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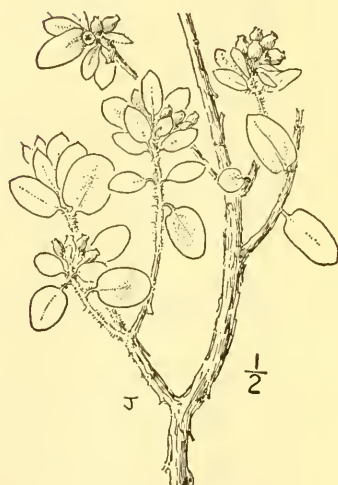
3713



3714



3715



3716

3708. *Arctostaphylos manzanita*
 3709. *Arctostaphylos pungens*
 3710. *Arctostaphylos rudis*

3711. *Arctostaphylos mewukka*
 3712. *Arctostaphylos insularis*
 3713. *Arctostaphylos viscida*

3714. *Arctostaphylos mariposa*
 3715. *Arctostaphylos drupacea*
 3716. *Arctostaphylos morroensis*

24. *Arctostaphylos cinerea* Howell. Waldo Manzanita. Fig. 3717.

Arctostaphylos cinerea Howell, Fl. N.W. Amer. 416. 1901.

Erect shrub, 1–2 m. high, densely branched from the base, bark rather light reddish brown, young branchlets cinereous. Leaves 2.5–3.5 cm. long, oblong to oblong-ovate, or obovate, obtuse to acute at apex, narrowed at base to flattish petiole, pallid and cinereous; bracts acuminate-lanceolate, cinereous, only the very lowest foliaceous; pedicels longer than the bracts, glandular-pubescent; corolla tinged with rose, 6–7 mm. long; fruit depressed-globose, pubescent at least when young.

Dry hillsides and mountain slopes, Arid Transition Zone; Josephine County, Oregon, to Del Norte County, California. Type locality: "Rocky hillsides along the eastern base of the Coast Mountains, near Waldo, Oregon." April–May. Del Norte Manzanita.

Arctostaphylos parvifolia Howell, Fl. N.W. Amer. 416. 1901. Erect shrub, branching from the base, old branches polished and dark red-brown, young branchlets minutely white-tomentose. Leaves mostly less than 2.5 cm. long, oblong to cuneate-oblong, obtuse or acutish, light gray-green; petioles flattened; bracts triangular, short-acuminate, minutely pubescent; pedicels not longer than the lower bracts, minutely pubescent; ovary and fruit glabrous. Gravelly hillsides, Josephine County, Oregon, to Del Norte County, California. Type locality: near Andersons, Josephine County.

25. *Arctostaphylos canescens* Eastw. Hoary Manzanita. Fig. 3718.

Arctostaphylos canescens Eastw. Proc. Calif. Acad. III. 1: 84. 1897.

Arctostaphylos strigosa Howell, Fl. N.W. Amer. 417. 1901.

Arctostaphylos bractcata Howell, loc. cit.

Uva-ursi canescens Heller, Cat. N. Amer. Pl. ed. 3. 276. 1914.

Shrub 1–2 m. high, stems not enlarged at base and fire-killed, dark red, young branchlets densely canescent. Leaves when young densely white-tomentulose or the margins rose-colored, becoming glabrate in age, oblong-ovate to ovate, 3–4 cm. long, thick and pallid; panicles short, densely flowered; bracts foliaceous, generally longer than the hairy pedicels; corolla white; ovary densely white-hairy; fruit depressed-globose, 7–8 mm. broad.

Gravelly ridges, Humid Transition and Upper Sonoran Zones; Siskiyou Mountains, southern Oregon to the Coast Ranges of central California. Type locality: Mount Tamalpais, Marin County, California. Jan.–March.

Arctostaphylos canescens var. *sonomensis* (Eastw.) J. E. Adams ex. McMinn, Ill. Man. Calif. Shrubs 409. 1939. (*Arctostaphylos sonomensis* Eastw. Leaflets West. Bot. 1: 78. 1933.) Erect shrub with spreading branches, about 1 m. high, not stump-sprouting; young branchlets viscid-puberulent. Leaves oblong to ovate-lanceolate, 2–3 cm. long, acute, pale green and sparsely pubescent; panicle congested; bracts foliaceous, exceeding the glandular pedicels; fruit viscid-pubescent. Type locality: Rincon Ridge, near Santa Rosa, Sonoma County, California.

Arctostaphylos candidissima Eastw. Leaflets West. Bot. 3: 124. 1942. Shrub 1–2 m. high with densely white-velvety young stems and leaves; leaves oblong to broadly oval; flowers in short racemes; bracts foliaceous; ovary densely velvety. Hillsides in the Coast Ranges, Mendocino and Tehama Counties to Lake, Napa, and Glenn Counties, California. Type locality: Log Spring Ridge, Tehama County.

26. *Arctostaphylos silvicola* Jeps. & Wiesel. Silver-leaved Manzanita. Fig. 3719.

Arctostaphylos silvicola Jeps. & Wiesel. ex. Jepson, Erythra 8: 101. 1938.

Erect shrub 1.5–2.5 m. high with silver-gray foliage and smooth dark red bark, branchlets densely tomentose, rarely with a few scattering short-hirsute hairs. Leaves elliptic to broadly oblong or rarely oblanceolate, 1.5–3.5 cm. long, obtuse to round-cuneate at base, acutish to rounded and rather prominently apiculate at apex, usually densely grayish tomentose beneath, thinly tomentose and greener above; petioles 3–6 mm. long; nascent inflorescence drooping, usually with 2–5 racemose branches; bracts foliaceous, tomentose; pedicels nearly or quite glabrous; corolla white, 6–7 mm. long; ovary glabrous or sparsely pubescent at the summit; fruit nearly globose, light brown, 6–8 mm. broad, glabrous; nutlets separating.

Sandy soils, Humid Transition Zone; on old marine sand deposits in the vicinity of Mount Hermon, Santa Cruz Mountains, California. Type locality: near Felton Big Trees, Santa Cruz County. Feb.–March.

Arctostaphylos glutinosa Schreiber, Amer. Midl. Nat. 23: 620. pl. 1. fig. 2. 1940. Shrub, 6–12 dm. high, with polished red-brown trunk and branches, without enlarged burl-like base and fire-killed, young branches densely gray-tomentulose and minutely viscid-glandular with intermingling whitish bristle-like hairs. Leaves gray-green densely to thinly canescent, ovate to oblong, 2–4 rarely 5 cm. long, 1–2.5 cm. wide, acute at apex, cordate or auriculate at base, entire or often toothed below the middle, sessile or short-petioled; nascent inflorescence 1–2 cm. long, simple; bracts lanceolate, 7–12 mm. long, canescent with white bristly margins; corolla pinkish white, 6–7 mm. long; pedicels glandular-hirsute, 5 mm. long; fruit light brown, subglobose, 9–14 mm. wide, densely stipitate-glandular. Hillsides of Monterey shale, near the border of the Upper Sonoran and Humid Transition Zones; Santa Cruz Mountains, west of Bonnie Doon Ridge, California. Type locality: about 2 miles southwest of Eagle Rock, Santa Cruz County, California.

27. *Arctostaphylos obispoensis* Eastw. Serpentine Manzanita. Fig. 3720.

Arctostaphylos obispoensis Eastw. Leaflets West. Bot. 2: 8. 1937.

Erect shrub 1–2.5 m. high with gray-green foliage and smooth dark red-purple bark, branchlets gray-tomentulose or pilose-tomentose. Leaves ovate to ovate-lanceolate, 2–4 cm. long, truncate or subcordate, or sometimes rounded at base; petioles 3–5 mm. long; bracts foliaceous, linear-lanceolate, the upper little-reduced, tomentose, spreading and recurved in fruit; pedicels glabrous; corolla pinkish white, 6–7 mm. long; ovary glabrous; fruit globose, 6–7 mm. broad, light brown; nutlets separating.

Serpentine outcrops, Upper Sonoran Zone; Coast Ranges, San Luis Obispo County and southern Monterey County, California. Type locality: serpentine area on the upper elevations of Chorro Creek, near San Luis Obispo. Feb.–March.

28. *Arctostaphylos otayensis* Wiesel. & Schr. Otay Manzanita. Fig. 3721.

Arctostaphylos otayensis Wiesel. & Schr. Madroño 5: 43. fig. 2d. 1939.

Arctostaphylos glandulosa var. *australis* J. E. Adams, Journ. E. Mitchell Sci. Soc. 56: 51. 1940.

Erect shrub, 1–2.5 m. high, without burl-like base, fire-killed, trunk and older branches dark red-brown, smooth, the young branchlets glandular-pubescent. Leaves elliptic to oblong, 1.5–3.5 cm. long, rounded or truncate at base, usually acute at apex, finely tomentulose and microscopically glandular on both sides or glabrate; petioles 4–7 mm. long; nascent inflorescence erect or suberect, clustered at the ends of the branches, 1–2 cm. long; bracts foliaceous, lanceolate, 3–15 mm. long, glandular-pubescent; corolla white, 5–7 mm. long; pedicels glandular-hairy; ovary glandular-pubescent, sometimes sparsely so; fruit subglobose, 5–8 mm. broad, light brown, shining, glabrate, microscopically glandular or rarely pubescent; nutlets with 2–3 coalescent, or rarely with all coalesced into a single stone.

Mountain slopes, Upper Sonoran Zone; Otay Mountain, the type locality, San Diego County, California. Jan.–March.

29. *Arctostaphylos Tràcyi* Eastw. Tracy's Manzanita. Fig. 3722.

Arctostaphylos Tràcyi Eastw. Leaflets West. Bot. 1: 79. 1933.

Arctostaphylos columbiana var. *Tracyi* J. E. Adams ex. McMinn, Ill. Man. Calif. Shrubs 408. 1939.

Shrub about 2 m. high, with erect branches; bark polished, reddish purple; young branches puberulent without hispid hairs. Leaves ovate to narrowly elliptic, 3–6 cm. long, rather thin, bright green and glabrous, or very sparingly puberulent when young, veiny, obtuse at base; petioles puberulent; bracts narrowly lanceolate, puberulent or glabrous; pedicels shorter than the bracts, sparingly pubescent; corolla white; ovary densely white-tomentose, not glandular.

Edges of woods, near the coast, Humid Transition Zone; Del Norte and Humboldt Counties, California. Type locality: Big Lagoon and Patrick's Point, Humboldt County, California. Feb.

30. *Arctostaphylos virgata* Eastw. Bolinas Manzanita. Fig. 3723.

Arctostaphylos virgata Eastw. in Sarg. Trees & Shrubs 1: 203. 1905.

Arctostaphylos columbiana var. *virgata* McMinn ex. Jepson, Fl. Calif. 3: 49. 1939.

Shrub, 2–4 dm. high, with erect branches, the branchlets, petioles and inflorescence densely glandular villous-pubescent, rarely with a few setose bristles. Leaves ascending, bright green, thin, oblong to ovate-lanceolate, 4–6 cm. long, acute at apex, obtuse at base; panicle densely flowered; bracts foliaceous; pedicels glandular with spreading hairs; corolla white or tinged with rose; fruit slightly depressed-globose, viscid.

Canyon slopes and open woods, Humid Transition Zone; Coast Ranges, Marin County, California. Type locality: Mount Tamalpais and the hills west of Tomales Bay, Marin County. Feb.–April.

31. *Arctostaphylos columbiàna* Piper. Columbia Manzanita. Fig. 3724.

Arctostaphylos columbiana Piper in Piper & Beattie, Fl. Northw. Coast 279. 1915.

Arctostaphylos setosissima Eastw. Leaflets West. Bot. 1: 78. 1933.

Much branched often arborescent shrub, 1–3 m. high; root crown not enlarged, and not stump-sprouting after fire; young branchlets densely cinereous-pubescent and hirsute. Leaves oblong to oblong-ovate, 2–6 cm. long, pale green and tomentose on both sides, becoming glabrous above in age; petioles short, tomentose and somewhat hirsute; panicle rather compact with short branches; bracts foliaceous; rachis tomentose; pedicels pubescent; corolla white or tinged with pink, 6–7 mm. long; ovary tomentose; fruit strongly depressed-globose, 7–10 mm. broad, about half as high, rather light brown.

Open woods and rocky ridges, Humid Transition Zone; Vancouver Island south, west of the Cascade Mountains, to northwestern California. Type locality: near Union City, Mason County, Washington. March–May.

32. *Arctostaphylos pilosula* Jeps. & Wiesel. La Panza Manzanita. Fig. 3725.

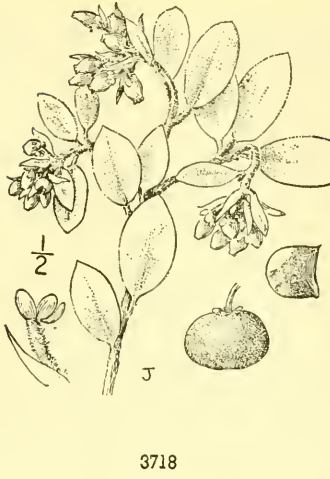
Arctostaphylos pilosula Jeps. & Wiesel. ex Jepson, Erythea 8: 101. 1938.

Erect shrub, 1–3 m. high, fire-killed, the trunk not forming a burl-like base, trunk and older branches smooth and dark red-brown, young branchlets pubescent and usually with interspersed bristly hairs. Leaves 1.5–4.5 cm. long, oblong to elliptic or ovate, acutish to rounded at apex and usually distinctly apiculate, rounded to truncate or rarely subcordate at base, pale grayish green, glabrous or sparsely tomentulose on both sides, when young rather densely white-tomentulose; nascent inflorescence mostly drooping, 10–15 mm. long; bracts foliaceous, lanceolate, 5–15 mm. long, rather densely appressed-pubescent and usually thinly short-hirsute at base; pedicel glabrous or rarely thinly villous-hirsute; fruit depressed-globose, 8–10 mm. broad, glabrous, brownish and usually marked with vertical blue-black stripes; nutlets separating.

Hillsides and mountain slopes usually associated with other shrubs, Upper Sonoran Zone; La Panza Range, San Luis Obispo County, California. Type locality: American Canyon, La Panza Range. Jan.–March.



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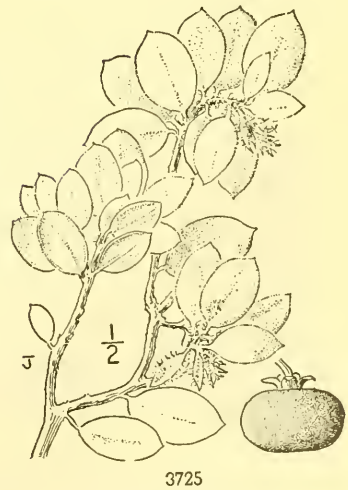
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3717 *Arctostaphylos cinerea*
3718. *Arctostaphylos canescens*
3719. *Arctostaphylos silvicola*

3720. *Arctostaphylos obispoensis*
3721. *Arctostaphylos otayensis*
3722. *Arctostaphylos Tracyi*

3723. *Arctostaphylos virgata*
3724. *Arctostaphylos columbiana*
3725. *Arctostaphylos pilosula*

33. *Arctostaphylos Andersonii* A. Gray. Santa Cruz Mountains. Fig. 3726.

Arctostaphylos Andersonii A. Gray, Proc. Amer. Acad. 11: 83. 1876.

Uva-ursi *Andersonii* Abrams, N. Amer. Fl. 29: 98. 1914.

Arctostaphylos regismontana Eastw. Leaflets West. Bot. 1: 77. 1933.

Arborescent shrub, 2–4 m. high, with erect often elongated branches, smooth dark red-brown bark; branchlets setose-hispid and glandular-villous. Leaves crowded, often 4–6 cm. long, ovate-oblong, acute or obtuse at the apex, sessile or nearly so and clasping at base, nearly glabrous above, more or less tomentose beneath; panicles ample, densely glandular-villous; bracts foliaceous; corolla 6–7 mm. long; ovary densely hairy and more or less glandular; fruit becoming nearly glabrous, depressed-globose, 6–8 mm. broad; nutlets irregularly coalescent.

Mountain slopes, mainly Humid Transition Zone; Santa Cruz Mountains, California. Type locality: mountain slopes near Santa Cruz, California. Jan.–March. Heart-leaved Manzanita.

Arctostaphylos Andersonii var. *pallida* (Eastw.) J. E. Adams ex. McMinn, Ill. Man. Calif. Shrubs 418. 1939. (*Arctostaphylos pallida* Eastw. Leaflets West. Bot. 1: 76. 1933.) Erect shrub, about 1 m. high, young branches viscid-pubescent. Leaves sessile, oblong, auriculate at base, 3–5 cm. long, pale green; bracts foliaceous; pedicels glandular-pubescent; ovary and fruit glandular. Hills back of Piedmont, Alameda and Contra Costa Counties, California. Type locality: Oakland Hills, Alameda County.

Arctostaphylos Andersonii var. *imbricata* (Eastw.) J. E. Adams, ex. McMinn, loc. cit. (*Arctostaphylos imbricata* Eastw. Proc. Calif. Acad. IV. 20: 14. 1931.) Low spreading shrub, young branches densely tomentose and glandular-villous. Leaves sessile, oblong, auriculate at base, 2.5–3 cm. long, densely clothing the stems; bracts foliaceous; pedicels glandular-pubescent; corolla white, 7 mm. long; fruit depressed-globose, viscid-pubescent. Type locality: San Bruno Hills, San Mateo County, California.

34. *Arctostaphylos auriculata* Eastw. Mount Diablo Manzanita. Fig. 3727.

Arctostaphylos auriculata Eastw. Bull. Torrey Club 32: 202. 1905.

Uva-ursi auriculata Abrams, N. Amer. Fl. 29: 98. 1914.

Arctostaphylos Andersonii var. *auriculata* Jepson, Madroño 1: 88. 1922.

Shrub, 1–1.5 m. high, with erect branches, smooth dark red-brown bark, and glaucous branchlets clothed with a dense hoary tomentum interspersed with long whitish hairs. Leaves oblong to ovate, obtuse or acute and mucronate at apex, nearly or quite sessile and strongly auriculate at the base, crowded and overlapping on the branches, pallid and cinereous-tomentose on both surfaces; panicles small and close, the branches, bracts and pedicels tomentose; calyx-lobes ciliate on the margins, otherwise glabrous; ovary pubescent with spreading hairs; fruit depressed-globose, light brown.

Dry chaparral-covered slopes, Upper Sonoran Zone; Contra Costa and Alameda Counties, California. Type locality: Mount Diablo. Feb.–March.

35. *Arctostaphylos pajaroensis* J. E. Adams. Pajaro Manzanita. Fig. 3728.

Arctostaphylos Andersonii var. *pajaroensis* J. E. Adams ex. McMinn, Ill. Man. Calif. Shrubs 418. fig. 492. 1939.

Arctostaphylos pajaroensis J. E. Adams, Journ. E. Mitchell Sci. Soc. 56: 41. 1940.

Erect shrub with compact crown, 1–3 m. high, bark exfoliating in shreds tardily, but stems finally becoming smooth, young branchlets tomentose and bristly white-hairy. Leaves ovate-triangular, 2–3 cm. long, auriculate-clasping at base, basal lobes acute or rounded, often serrate, glabrous, green or slightly glaucous.

Sandy hills, Upper Sonoran Zone; south of Pajaro River, Monterey County, California. Type locality: sandy hills west of Prunedale. Jan.–March.

36. *Arctostaphylos pechoensis* Dudley. Pecho Manzanita. Fig. 3729.

Arctostaphylos pechoensis Dudley ex Abrams, N. Amer. Fl. 29: 98, as a synonym. 1914.

Uva-ursi pechoensis Abrams, loc. cit.

Arctostaphylos Andersonii var. *pechoensis* Jepson, Madroño 1: 89. 1922.

Low shrub, 1 m. high or less, with smooth dark red-brown bark, the root crown enlarged and sprouting after fire; branchlets finely tomentose and setose-hispid. Leaves ovate to ovate-oblong, 2–3.5 cm. long, acute at the apex, strongly auriculate and clasping at the nearly or quite sessile base, pale green, firm-coriaceous, prominently net-veined on the lower surface and finely but usually sparsely tomentose; panicles congested, short; bracts broadly lanceolate, 8–12 mm. long, finely tomentose and somewhat viscid; pedicels nearly or quite smooth; calyx-lobes ciliate on the margins, otherwise glabrous; ovary sparsely hairy toward the summit; fruit depressed-globose, light brown; nutlets irregularly coalescent, thin and acutely carinate on the back.

Hillides and canyon slopes, Upper Sonoran Zone; Coast Ranges of San Luis Obispo and northern Santa Barbara Counties, California. Type locality: head of Wild Cherry Canyon, Pecho Mountains, San Luis Obispo County. Feb.–April.

Arctostaphylos pechoensis var. *viridissima* Eastw. Leaflets West. Bot. 1: 62. 1933. (*Arctostaphylos viridissima* McMinn, Ill. Man. Calif. Shrubs 419. 1939; *A. Andersonii* var. *viridissima* Jepson, Fl. Calif. 3: 50. 1939.) Leaves glabrous, bright green and shining. Santa Cruz Island, and on the mainland near the coast in La Purisima Hills, northern Santa Barbara County, California. Type locality: China Harbor, Santa Cruz Island.

37. *Arctostaphylos glandulosa* Eastw. Eastwood's Manzanita. Fig. 3730.

Arctostaphylos glandulosa Eastw. Proc. Calif. Acad. III. 1: 82. 1897.

Low spreading intricately branched shrub, with the enlarged burl-like base stump-sprouting

after fire, the young branchlets, petioles and leaves glandular-hairy. Leaves ovate to ovate-lanceolate, 3–5 cm. long, acute or obtuse at apex, obtuse or rounded at base, dull green and similar on both sides; bracts foliaceous; pedicels viscid-tomentose; corolla white, 7–8 mm. long; fruit depressed-globose, viscid-puberulent.

Dry rocky slopes and ridges, Humid Transition and Upper Sonoran Zones; Coos Bay, Oregon, south in the Coast Ranges to Orange County, California. Type locality: Mount Tamalpais, Marin County, California. Feb.–April. Crown Manzanita.

This species is extremely variable and exhaustive experimental and genetic studies as well as further field studies are necessary to determine the specific limits and the range of variability. Dr. J. E. Adams, long a student of the genus in the field and herbarium, has proposed the following varieties:

Leaves light green or pallid.

Branchlets not glandular.

Inflorescence and ovary not glandular; leaves light yellowish green.

var. *Howellii*.

Inflorescence and ovary glandular.

Branchlets canescently tomentulose; leaves with a light bloom.

var. *Cushingiana*.

Branchlets long white-hairy.

Inflorescence many-flowered and spreading.

var. *Campbelliae*.

Inflorescence few-flowered and compact.

var. *molis*.

Branchlets glandular-hairy, as in the typical species; leaves very pallid, scabrous.

var. *zacaensis*.

var. *crassifolia*.

Leaves dark green.

Arctostaphylos glandulosa var. *Howellii* (Eastw.) J. E. Adams ex McMinn, III. Man. Calif. Shrubs. 417. 1939. (*Arctostaphylos Howellii* Eastw. Leaflets West. Bot. 1: 123. 1934.) Erect shrub, 1–2 m. high, with spreading branches, old stems polished dark reddish brown, young branchlets finely tomentose. Leaves yellowish gray-green, oblong-elliptic to suborbicular, 3–5 cm. long, sparsely tomentose on both sides; branches of the panicle glandular-pubescent; bracts linear or triangular-subulate; fruit depressed-globose, sparsely tomentose and glandular-viscid. Central Monterey County, California. Type locality: Arroyo Seco Canyon, Santa Lucia Mountains.

Arctostaphylos glandulosa var. *Cushingiana* (Eastw.) J. E. Adams ex McMinn, loc. cit. (*Arctostaphylos Cushingiana* Eastw. Leaflets West. Bot. 1: 75. 1933.) Low densely branched shrub, 8–12 dm. high, old trunks dark reddish purple, branchlets tomentose and with scattering short hairs, somewhat viscid-glandular. Leaves ovate or elliptic to lanceolate, 2–4 cm. long, pallid gray-green, minutely tomentulose or soon glabrate; bracts foliaceous, glandular-tomentose and ciliate on the margins; pedicels densely white-tomentose; top of ovary sparingly white-pubescent; fruit depressed-globose, glabrous. Dry mountain slopes; Napa, Sonoma and Marin Counties, California. Type locality: south side of Mount Tamalpais, Marin County.

Arctostaphylos glandulosa var. *Campbelliae* (Eastw.) J. E. Adams ex McMinn, loc. cit. (*Arctostaphylos Campbelliae* Eastw. Leaflets West. Bot. 1: 74. 1933.) Low shrub, with the branchlets rather densely puberulent or tomentulose with intermingling coarse white spreading hairs. Leaves yellowish green, short-pubescent below, less so or glabrous above, acute at apex, obtuse at base; bracts foliaceous, lanceolate, the upper ones becoming broadly deltoid; ovary white-hairy, not glandular; fruit sparsely hairy. Dry ridges, Mount Hamilton, California. A local variation apparently restricted to the immediate vicinity of the mountain.

Arctostaphylos glandulosa var. *molis* J. E. Adams, Journ. E. Mitchell Sci. Soc. 56: 50. 1940. Erect shrub, 1–1.5 m. high, divaricately branch-branch; young branchlets pubescent and white-hairy, not glandular. Leaves pallid green, glabrescent, elliptic to ovate, acute at apex, acute or obtuse at base, 2–4 cm. long; panicles small, compact, few-flowered; bracts foliaceous, hirsute-ciliate; pedicels pubescent or somewhat glandular; ovary densely white-villous, not glandular. Santa Ynez Mountains, Santa Barbara County to the San Gabriel Mountains, Los Angeles County, California. Type locality: La Cumbre Peak, Santa Barbara County.

Arctostaphylos glandulosa var. *zacaensis* (Eastw.) J. E. Adams ex McMinn, III. Man. Calif. Shrubs 417. 1939. (*Arctostaphylos zacaensis* Eastw. Leaflets West Bot. 1: 79. 1933.) Much like the typical species in habit and its glandular pubescence, but leaves very pale grayish green, pubescent and scabrous and slightly glandular-hairy at base, 4–6 cm. long, 2–4 cm. wide, obtuse or acute and apiculate at apex, obtuse at base. Rocky slopes in the vicinity of Zaca Lake, Santa Barbara County, California. Type Locality: Zaca Lake.

Arctostaphylos glandulosa var. *crassifolia* Jepson, Madroño 1: 86. 1922. Erect shrub, about 1 m. high; young branchlets tomentulose and with or without a few scattering hairs, not glandular. Leaves dark green, dull or a little shiny, broadly elliptic to oval, acute to rounded at apex, mostly obtuse at base, 2–4.5 cm. long, glabrate above, tomentulose or glabrate beneath; pedicels pubescent; fruit sparsely pubescent or glabrate, not glandular. Sandy soils on the mesas near the coast, Oceanside to San Diego, San Diego County, California. Type locality: Del Mar, San Diego County.

38. *Arctostaphylos intricata* Howell. Siskiyou Manzanita. Fig. 3731.

Arctostaphylos intricata Howell, Fl. N.W. Amer. 416. 1901.

Erect shrub, 1–2 m. high, irregularly and intricately branched, old stems polished and very dark-colored, young branchlets tomentose and glandular-hispid or glandular-hispidulous. Leaves oblong-lanceolate to oblong-ovate, 2.5–4 cm. long; panicles short and dense; bracts foliaceous; pedicels sparsely glandular-pubescent with spreading hairs; corolla rose-colored or white, about 5 mm. long; ovary pubescent; fruit depressed-globose, pubescent, but not viscid.

Mountain slopes and canyons, mainly Transition Zones; southern Coos and Douglas Counties, Oregon, to Del Norte County, California. Type locality: stony hillsides, near Smith River, west of Gasquet, Del Norte County, California. April–May.

Arctostaphylos oblongifolia Howell, Fl. N.W. Amer. 416. 1901. (*Arctostaphylos viscida* var. *oblongifolia* J. E. Adams ex McMinn, III. Man. Calif. Shrubs 403. 1939.) Erect shrub, 1–2 m. high, densely branched from the base, the bark polished rich red-brown, branchlets cinereous. Leaves 2.5–3.5 cm. long, oblong to broadly ovate, usually abruptly contracted at base to a terete petiole, pallid green and smooth; bracts somewhat foliaceous, puberulent; pedicels longer than the bracts, pubescent and glandular; ovary pubescent; fruit depressed-globose. Rocky hillsides, Arid Transition Zone; southern Douglas County, Oregon, to Del Norte County, California. Type locality: "Rocky hillsides, eastern base of the coast mountains near Waldo, Oregon."

39. *Arctostaphylos crustacea* Eastw. Brittle-leaved Manzanita. Fig. 3732.

Arctostaphylos crustacea Eastw. Leaflets West. Bot. 1: 74. 1933.

Erect branching shrub, 1–2 m. high, the stems enlarged at the base and stump-sprouting after fire, dark reddish purple, young branchlets tomentose and more or less densely setose-bristly,



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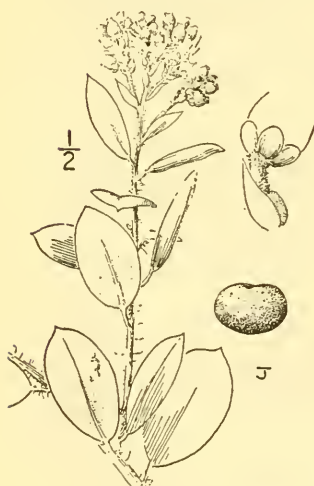
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3726. *Arctostaphylos Andersonii*
 3727. *Arctostaphylos auriculata*
 3728. *Arctostaphylos pajaroensis*

3729. *Arctostaphylos pechoensis*
 3730. *Arctostaphylos glandulosa*
 3731. *Arctostaphylos intricata*

3732. *Arctostaphylos crustacea*
 3733. *Arctostaphylos subcordata*
 3734. *Arctostaphylos bracteosa*

not at all glandular. Leaves bright green, sparsely tomentulose, oblong to ovate or ovate-lanceolate, acute or obtuse at apex, obtuse to subcordate at base; panicles ample, the branches tomentose and setose; lower bracts foliaceous, the upper deltoid-acuminate; pedicels densely hairy; corolla rose-colored or white, 5–6 mm. long; ovary densely pubescent; fruit depressed-globose, becoming nearly glabrous.

Dry ridges and slopes, Humid Transition and Upper Sonoran Zones; Coast Ranges of California from Contra Costa County to Los Angeles County. Type locality: Kings Mountain, San Mateo County, California. Feb.–April.

Arctostaphylos crustacea var. *tomentosiformis* J. E. Adams, Journ. E. Mitchell Sci. Soc. 56: 54. 1940. (*Arctostaphylos tomentosa* var. *crinata* J. E. Adams ex McMinn, Ill. Man. Calif. Shrubs 412, 640. 1939.) Erect shrub, young branchlets densely white-tomentose and setose-bristly. Leaves 2.5–5 cm. long, densely white-tomentose beneath. Dry hillsides and ridges, Año Nuevo Point, San Mateo County to the pine barrens of Cypress Point, Monterey County, California. Type locality: Bonnie Doon Ridge, Santa Cruz County.

Arctostaphylos Rösei Eastw. Leaflets West. Bot. 1: 77. 1933. (*Arctostaphylos crustacea* var. *Rosei* McMinn, Ill. Man. Calif. Shrubs 413, 640. 1939.) Erect shrub, about 1 m. high, young branchlets sparsely tomentose without setose bristles. Leaves oblong to ovate-oblong, thin and leathery, bright green, 4–6 cm. long; lower bracts foliaceous, upper deltoid; pedicels pubescent; fruit depressed-globose, or broadly ovoid, sparsely pubescent. Hillsides bordering Lake Merced, San Francisco; seems to intergrade with *A. crustacea*.

40. *Arctostaphylos subcordata* Eastw. Santa Cruz Island Manzanita. Fig. 3733.

Arctostaphylos subcordata Eastw. Leaflets West. Bot. 1: 61. 1933.

Erect shrub with spreading branches, 1–2 m. high, stems and older branches smooth reddish brown, young twigs cinereous-tomentose and more or less glandular-villous with spreading hairs. Leaves ovate-elliptic to broadly lanceolate, 2–5 cm. long, 1.5–3 cm. wide, subcordate or sometimes truncate at base, obtuse to acute at apex, glandular-ciliate on the margins, upper surface glabrous or nearly so and shiny with very few or no stomata, lower surface rather thinly tomentulose; petioles 2–5 mm. long, densely puberulent with a few intermingling longer hairs; panicles subsessile with 2–3 short densely flowered racemes; bracts lanceolate, 6–10 mm. long, exceeding the glandular-tomentulose pedicels; corolla 4–5 mm. long; ovary densely canescent; fruit depressed-globose, 6–8 mm. broad, thinly short-pubescent, ridged by the angled nutlets, these separating readily.

Stony ridges, Upper Sonoran Zone; Santa Cruz Island, southern California. Type locality: near the west end of Santa Cruz Island. Jan.–March. Closely related to *Arctostaphylos bracteosa* of the mainland.

Arctostaphylos confertiflora Eastw. Leaflets West. Bot. 1: 122. 1934. Closely resembling *Arctostaphylos subcordata*; leaves and twigs glandular-pubescent but generally without tomentum; inflorescence densely glandular-pubescent; bracts less attenuate at apex and more or less recurved-spreading. Plants growing in canyons and on protected slopes erect shrubs, those of wind-swept summits more or less prostrate and often with broader leaves rounded at apex. Santa Rosa Island, southern California.

41. *Arctostaphylos bracteosa* (DC.) Abrams. Coast Manzanita. Fig. 3734.

Andromeda bracteosa DC. Prod. 7: 607. 1839.

Arctostaphylos bracteosa Abrams, Leaflets West. Bot. 1: 84. 1934.

Arctostaphylos tomentosa var. *bracteosa* Jepson, Fl. Calif. 3: 48. 1939.

Arctostaphylos tomentosa subsp. *bracteosa* J. E. Adams, Journ. E. Mitchell Sci. Soc. 56: 57. 1940.

Erect shrub, 1–2 m. high, forming a burl-like base and stump-sprouting after fire, bark of old branches shredded and tardily shedding, young branchlets glandular-villous and often more or less tomentose. Leaves canescent when young, in age glabrate and green at least above, ovate-elliptic, 2.5–4 cm. long, usually subcordate or truncate at base; petioles short; panicles congested; bracts foliaceous, glandular-ciliate; pedicels shorter than the bracts, glandular-villous; ovary densely white-pubescent; fruit depressed-globose, sparsely pubescent.

Well-drained rocky or sandy soils, Transition and Upper Sonoran Zones; Monterey Peninsula and neighboring mountains near the coast. Type locality: collected by Douglas in California, but definite locality not given; erroneously attributed to Drummond by De Candolle. Feb.–March.

Arctostaphylos bracteosa var. *hebeclada* (DC.) Eastw. Leaflets West. Bot. 1: 122. 1934. (*Andromeda bracteosa* β. *hebeclada* DC. Prod. 7: 607. 1839.) Very similar to the typical species but with glandular hairs. This variety is somewhat intermediate between *A. bracteosa* and *A. tomentosa* and occurs on the Monterey Peninsula, often associated with these species suggesting hybrid origin. All of these have very few or no stomata on the upper surface of the leaves.

42. *Arctostaphylos tomentosa* (Pursh) Lindl. Shaggy-barked Manzanita. Fig. 3735.

Arbutus tomentosa Pursh, Fl. Amer. Sept. 282. 1814.

Arctostaphylos tomentosa Lindl. Bot. Reg. 21: pl. 1791. 1836.

Arctostaphylos vestita Eastw. in Sarg. Trees & Shrubs 1: 205. 1905.

Uva-ursi vestita Abrams, N. Amer. Fl. 29: 98. 1914.

An erect divaricately branched shrub, 1–2 m. high, forming a burl at base and stump-sprouting after fire, bark on old trunks brown, shreddy and tardily exfoliating; branchlets tomentose. Leaves oblong, ovate or elliptic, obtuse or acute and apiculate at the apex, cordate to obtuse at base, 2.5–4 cm. long, thin-coriaceous, green and sparsely tomentulose above, hoary-tomentose below, or rarely the pubescence becoming sparse on both surfaces in age; branches of the rather congested panicle tomentose; lower bracts foliaceous, 8–12 mm. long, the upper lanceolate-acuminate, 5–7 mm. long, firm and persistent; pedicels stout, tomentose; calyx-lobes ciliate on the margins; ovary densely tomentose; fruits light brown, depressed-globose; nutlets irregularly coalescent.

Sandy soils, Upper Sonoran and Humid Transition Zones; near the coast, Monterey County, California. Especially abundant on the Monterey Peninsula, where without doubt the original specimen that has been chosen as the type was collected. Jan.–March.

3735. *Arctostaphylos tomentosa*3736. *Arctostaphylos glauca*3737. *Vaccinium ovatum*43. *Arctostaphylos glauca* Lindl. Big-berried Manzanita. Fig. 3736.*Arctostaphylos glauca* Lindl. Bot. Reg. 21: pl. 1791. 1836.*Xerobotrys glauca* Nutt. Trans. Amer. Phil. Soc. 11. 8: 268. 1843.*Uva-ursi glauca* Abrams, Bull. N.Y. Bot. Gard. 6: 433. 1910.*Arctostaphylos glauca* var. *eremicola* Jepson, Madroño 1: 78. 1922.*Arctostaphylos glauca* var. *puberula* J. T. Howell, Leaflets West. Bot. 2: 70. 1938.

Arborescent shrub or small tree, 2-6 m. high, with a trunk sometimes 3 dm. in diameter; bark smooth, red-brown, the branchlets pale green and glaucous, glabrous or rarely sparingly glandular. Leaves broadly ovate, varying to oblong or elliptic, obtuse at apex, obtuse to subcordate at base, 2-4 cm. long, firm-coriaceous, pale green and glaucous, glabrous; petioles 7-10 mm. long; flowers in an ample panicle or sometimes a simple raceme, the rachis glabrous or slightly puberulent; bracts triangular-lanceolate, persistent, rigid and divergent in fruit; pedicels glandular-pubescent; calyx-lobes ciliate or smooth on the margins; corolla white or tinged with pink, 8-9 mm. long; ovary viscid-glandular; fruit ovoid, 12-15 mm. long, very viscid, the pericarp thin without granular pulp; nutlets united into a solid smooth apiculate stone, the union of the nutlets marked by longitudinal lines.

Canyon slopes, Upper Sonoran Zone; Coast Ranges from Mount Diablo, Contra Costa County, to northern Lower California. Type locality: collected by Douglas in the California Coast Ranges but definite locality not known. Dec.-Feb.

Family 115. VACCINIACEAE.

HUCKLEBERRY FAMILY.

Erect or slender trailing shrubs or trees, with scaly buds. Leaves simple, alternate deciduous or evergreen. Flowers perfect, solitary or clustered, commonly bracteate. Calyx-tube adnate to the ovary for all or the greater part of its length, the limb toothed or entire. Corolla sympetalous, or rarely almost choripetalous, varied as to form, but often urceolate, deciduous. Stamens twice as many as corolla-lobes, epigynous or on an epigynous disk; anthers attached dorsally, introrse, the sacs prolonged at the apex into a slender tube with a terminal pore, with or without dorsal awns. Ovary mainly inferior, usually crowned by an epigynous disk, 4-10-celled. Style 1, filiform; stigma simple. Ovules 1 to many in each cavity, anatropous, on axile placentae. Fruit berry-like. Seeds many, compressed, with a bony seed-coat; embryo straight, imbedded in copious fleshy endosperm.

A family of about 20 genera and over 300 species, widely distributed through the northern and southern hemispheres.

Erect or caespitose shrubs; corolla merely toothed, cylindric or urceolate.

1. *Vaccinium*.

Trailing vines; corolla deeply 4-cleft, the lobes spreading.

2. *Oxycoccus*.

1. *VACCINIUM* L. Sp. Pl. 349. 1753.

Small or medium-sized shrubs, with terete or angled branchlets. Leaves alternate, mostly thin and deciduous, more or less coriaceous and persistent. Flowers axillary, solitary or in small clusters, pedicellate. Calyx-limb entire or with 4 or 5 small teeth. Corolla globose or ovoid and more or less urceolate. Stamens twice as many as corolla-lobes, included; filaments glabrous or pubescent; anthers awned on the back or awnless; pollen-sacs prolonged into an elongated tube at the apex. Ovary 4-5-celled, without false partitions. Fruit berry-like, red, blue, or blue-black, with or without a bloom. [Classical name of the Bilberry.]

A genus of approximately 150 species, of which about 25 are natives of the United States. Type species, *Vaccinium Myrtillus* L.

Leaves thick, coriaceous, persistent; filaments hairy. (Section *Vitis-Idaea*)

1. *V. ovatum*.

Leaves not coriaceous, deciduous, sometimes tardily so in young plants of *V. parvifolium*; filaments glabrous. (Section *Euvaccinium*)

Flowers in clusters of 2-4; calyx-limb deeply 4-5-lobed, the lobes about equaling the tube.

Leaves rather thick, prominently veined, obtuse or retuse at the apex.

2. *V. uliginosum*.

Leaves thin, obscurely veined, obtuse or acute at the apex.

3. *V. occidentale*.

Flowers solitary in the axils; calyx-limb obscurely lobed, usually merely undulate on the margin.

Branchlets terete or only slightly angled; leaves revolute, narrowed from the middle or above to the base; berry black with a bloom.

Leaves green on both surfaces, somewhat shining above; corolla ovoid; berry 3-5 mm. in diameter.

4. *V. caespitosum*.

Leaves pale green above, glaucescent beneath; corolla globose; berry 6-7 mm. in diameter.

5. *V. deliciosum*.

Branchlets angled; leaves rounded or only abruptly narrowed at the base.

Leaves distinctly and finely serrulate, especially above the middle, mostly acute or acutish at the apex.

Pedicels 6 mm. or more long; leaves 2 cm. or more in length; berry 6-10 mm. in diameter, reddish or black.

6. *V. membranaceum*.

Pedicels 1-3 mm. long; leaves seldom more than 1 cm. long; berry bright red, 3-5 mm. in diameter.

7. *V. scoparium*.

Leaves entire or only remotely serrulate, usually rounded at both ends.

Berry black with or without a bloom; corolla pink, ovoid; leaves not strongly reticulate.

8. *V. ovalifolium*.

Berry bright red; corolla greenish white or greenish yellow, subglobose; leaves prominently reticulate beneath.

9. *V. parvifolium*.

1. *Vaccinium ovatum* Pursh. Evergreen or Shot Huckleberry. Fig. 3737.

Vaccinium ovatum Pursh, Fl. Amer. Sept. 290. 1814.

Vaccinium lanceolatum Dunal in DC. Prod. 7: 570. 1838.

Metagonia ovata Nutt. Trans. Amer. Phil. Soc. II. 7: 263. 1843.

Rigidly erect, much-branched shrubs, 0.5-2 m. or rarely 3 m. high, the branchlets pubescent. Leaves firm-coriaceous, ovate to oblong-lanceolate, acute or acutish at the apex, rounded at base, 1-4 cm. long, distinctly serrate, glabrous, dark green and shining above, paler beneath, short-petioled, often slightly revolute; flower-clusters mostly axillary; bracts red, deciduous; corolla campanulate, pink to white, 5-7 mm. long; berry blackish usually without bloom, ovoid or ovoid-globose, 6-9 mm. long, sweetish and edible.

Humid Transition and coastal Canadian Zones; British Columbia to central California. Type locality: on the Columbia River and on the Northwest Coast. March-June.

Vaccinium ovatum var. *saparosum* Jepson, Man. Fl. Pl. Calif. 751. 1925. Differs from the species in having pear-shaped berries covered with a glaucous bloom. Occasional with the species throughout its range in California. Type locality: Gualala, Mendocino County.

2. *Vaccinium uliginosum* L. Bog Bilberry or Bog Blueberry. Fig. 3738.

Vaccinium uliginosum L. Sp. Pl. 350. 1753.

Low much-branched shrub, 1-6 dm. high with terete glabrous branches. Leaves 10-25 mm. long, obovate or oblong to oval; rounded or obtuse at the apex and obscurely mucronate, narrowed at the base, entire, firm and thickish, green above, paler beneath and conspicuously reticulate-veined; flowers in clusters of 2-4 or sometimes solitary near the ends of the branchlets, pendent on very short pedicels; calyx 4-5-lobed, the lobes rounded or acutish, 1-1.5 mm. long; corolla pink, ovoid-urceolate, 5-7 mm. long, shallowly 4-5-lobed; stamens 8 or 10; berry blue-black with a bloom, globose, 6-7 mm. in diameter, sweet, but of poor quality.

In bogs, Hudsonian and Canadian Zones; a circumboreal species, found on the Pacific Coast from Alaska to Humboldt County, California. Usually near the coast, but extending into the Olympic Mountains. What seem to be intermediate forms between this species and the next are on Mount Hood and in the Cascade Mountains of Washington. Type locality: Europe. July.

3. *Vaccinium occidentale* A. Gray. Western Blueberry or Western Huckleberry. Fig. 3739.

Vaccinium occidentale A. Gray, Bot. Calif. 1: 451. 1876.

Low glabrous shrub, 3-6 dm. high, with terete branchlets. Leaves thin but firm, obovate or

oblanceolate, 1–2 cm. long, entire, acutish or obtusish at the apex, narrowed toward the base, dull green and pale on both surfaces, or glaucescent beneath, obscurely reticulate; flowers mostly solitary, or 2 together; calyx 4–5-lobed, the lobes deltoid, acute or acutish, about 1 mm. long; corolla white or pinkish, oblong-ovoid, the very short lobes recurved; stamens 8–10; berry blue-black, with a bloom, globose or subglobose, 4–5.5 mm. in diameter, sweetish, but of rather poor quality.

Bogs and swamps, Boreal Zones; Cascade Mountains, British Columbia, southward, mostly on the eastern slopes of the Cascades to the Siskiyou Mountains and the southern Sierra Nevada, California; also in scattering stations in the mountains of eastern Washington and Oregon, extending to Montana, Utah and Nevada. Type locality: Sierra Nevada, at 6,000 or 7,000 feet, from Mariposa County to Sierra County, California. June–July.

4. *Vaccinium caespitosum* Michx. Dwarf Bilberry or Dwarf Huckleberry.

Fig. 3740.

Vaccinium caespitosum Michx. Fl. Bor. Amer. 1: 234. 1803.

Depressed or tufted dwarf shrubs, 5–30 cm. high, with minutely puberulent or usually glabrous, terete branchlets. Leaves obovate, oblanceolate, 1–3 cm. long, rounded to acute at apex, cuncate at base, usually glossy green above, serrulate especially toward the apex, the teeth tipped by a bristle-like hair; flowers solitary in the axils, nodding on short curved pedicels; calyx-lobes obscure, appearing merely as undulations; corolla ovoid-urceolate, 5–6 mm. long; stamens 8–10; berry blue-black, with a bloom, globose, 3–6 mm. in diameter, sweet and palatable.

Wet meadows and moist rocky ridges, Boreal Zones; Alaska southward to northwestern California and the southern Sierra Nevada, eastward to New England. Type locality: northernmost America, particularly Hudson Bay. June–July.

The Sierra Nevada plants have been described as a distinct species (*Vaccinium nivictim* Camp, Brittonia 4: 211. 1942). They are characterized mainly by their glaucous instead of bright green leaves, but intermediates are found in the Cascade Mountains. Type locality: Desolation Valley, Eldorado County, California.

Vaccinium caespitosum var. *arbuscula* A. Gray, Syn. Fl. N. Amer. 2¹: 24. 1878. (*Vaccinium arbuscula* Merriam, N. Amer. Fauna 16: 159. 1899.) Erect and bushy, 4–6 dm. high, with reddish branches. Mount Shasta and Plumas County, California, at lower altitudes, mostly near the border of the Transition and Canadian Zones. Type locality: Plumas County, without definite locality.

5. *Vaccinium delicosum* Piper. Rainier Bilberry or Blue-leaved Huckleberry.

Fig. 3741.

Vaccinium delicosum Piper, Mazama 2: 103. 1901.

Low densely branched shrub, 1–3 dm. high, glabrous throughout, the branchlets obscurely angled. Leaves obovate or rarely broadly elliptic, 15–35 mm. long, pale green, acutish or acute at the apex, mostly cuneate at the base, distinctly crenately serrulate above the middle, pale green above, glaucescent beneath; flowers solitary in the axils, nodding on curved pedicels of about equal length; calyx-lobes 5, appearing as mere undulations; corolla pinkish, 5–6 mm. long, subglobose; stamens 10; berries blue-black, with a bloom, globose to pyriform, 6–7 mm. in diameter, sweet and palatable.

Alpine meadows, Hudsonian Zone; Olympic and Cascade Mountains, Washington, to the Three Sisters, Cascade Mountains, Oregon. Type locality: Mount Rainier. This species has been confused with the Old World *Vaccinium Myrtillus* L. to which it is very closely related. July.

6. *Vaccinium membranaceum* Dougl. Mountain Bilberry or Blue Huckleberry.

Fig. 3742.

Vaccinium myrtilloides var. *macrophylla* Hook. Fl. Bor. Amer. 2: 32. 1834.

Vaccinium membranaceum Dougl. ex Hook. Fl. Bor. Amer. 2: 32. 1834, as a synonym; Torr. Bot. Wilkes Exp. 377. 1878.

Vaccinium macrophyllum Piper, Contr. U.S. Nat. Herb. 11: 443. 1906.

Erect branching shrub, 1–2 m. high, glabrous throughout, the twigs slightly angled. Leaves ovate to oval or obovate, 2–6 cm. long, varying from acute to obtuse or occasionally rounded at apex, rounded or slightly cuneate at base, serrulate, thin and rather membranaceous, green above, paler beneath; petioles 1–2 mm. long; flowers solitary in the axils; pedicels recurved in flower, erect in fruit, usually much exceeding the flowers; calyx entire or undulate-margined; corolla yellowish, depressed-globose or globose-urceolate, 4–5 mm. in diameter; berry dark wine-colored or purplish black, without bloom, globose, 7–10 mm. in diameter, subacid, aromatic, and of delicious flavor.

Coniferous forests, Canadian Zone; British Columbia to northern Michigan, Wyoming, and northern California. Common in the Pacific States and extending as far south as Humboldt County and the Siskiyou Mountains, California. Type locality: "Summit of the high mountains of the Grand Rapids" (Cascades of the Columbia). June–July.

Vaccinium coccineum Piper, Proc. Biol. Soc. Wash. 31: 75. 1918. Erect shrub, 1–1.5 m. high, with slightly angled branchlets. Leaves 2–3 cm. long, thin-membranaceous, bright green on both surfaces, reticulate-veined beneath, mostly obovate, acute or acutish, short-petioled, serrulate, minutely puberulent on the veins above, sparingly glanduliferous beneath and each serration tipped with a similar hair; flowers solitary on short stout pedicels; calyx obscurely lobed; berry bright red, 6–8 mm. in diameter, depressed-globose. A little-known species in the Canadian Zone of the Siskiyou Mountains, southern Oregon. Perhaps only a red-berried form of *Vaccinium membranaceum* Dougl. Type locality: Steve Peak, Josephine County, Oregon, on sandy slopes and ridges, 5,200 feet altitude.

7. *Vaccinium scoparium* Leiberg. Grouseberry or Dwarf Red Whortleberry.

Fig. 3743.

Vaccinium myrtillus var. *microphyllum* Hook. Fl. Bor. Amer. 2: 33. 1834.*Vaccinium microphyllum* Rydb. Bull. Torrey Club 24: 251. 1897. Not Reinw. 1826.*Vaccinium scoparium* Leiberg, Mazama 1: 196. 1897.

Low tufted shrub, 1-4 dm. high, glabrous throughout, the branchlets green and conspicuously angled. Leaves oval to broadly elliptic, 5-12 mm. long, rounded to acute at both ends, pale green and shining above, dull beneath, serrulate; flowers solitary in the axils, about equaling the nodding pedicels; calyx shallowly lobed or merely undulate-margined; corolla light or dark pink, ovoid-urceolate, about 3 mm. long; berry light red, 3-5 mm. in diameter, globose, sweet and palatable.

Hudsonian and Canadian Zones; Alaska to northern California east to Colorado and Utah. Fairly common on the Olympic and Cascade Mountains, and abundant as an undershrub on the high mountains of eastern Washington and Oregon; also sparingly found in the Siskiyou and Salmon Mountains of Oregon and northern California. Type locality: "Alpine woods near the Height of Land and Columbia Portage. Drummond." July.

8. *Vaccinium ovalifolium* Smith. Oval-leaved Bilberry. Fig. 3744.*Vaccinium ovalifolium* Smith in Rees, Cycl. 36: no. 2. 1817.

A slender straggling shrub, 1-3.5 m. high, with glabrous foliage and slightly angled branchlets. Leaves oval or oblong, mostly rounded to acutish at the apex, rounded at the base, thin, pale green above, usually glaucescent beneath, entire or more or less serrulate; flowers solitary in the axils on pedicels of about the same length; calyx minutely lobed or merely undulate-margined; corolla ovoid or subglobose, 6-8 mm. long, pinkish; berry globose, 8-10 mm. in diameter, blue-black with more or less bloom, subacid and palatable.

Dry woods, Humid Transition and lower Canadian Zones; Washington and northern Oregon; widely distributed over North America from Alaska to Montana, Quebec, and Michigan. Type locality: "Brought by Mr. Menzies from the west coast of America." May-June.

9. *Vaccinium parvifolium* Smith. Red Bilberry or Red Huckleberry. Fig. 3745.*Vaccinium parvifolium* Smith in Rees, Cycl. 36: no. 3. 1817.

Erect glabrous shrub, 1-4 m. high, with green sharply angled, articulated branchlets. Leaves 8-35 mm. long, varying from ovate to oblong, usually oval, obtuse or sometimes acutish at apex, rounded or abruptly narrowed at base, entire or nearly so, dull green above, paler beneath, thin; flowers solitary in the axils, usually exceeded by the recurved pedicels; calyx more or less distinctly 5-lobed, the lobes less than 1 mm. long; corolla depressed-globose, 4-6 mm. long; greenish white or greenish yellow; berry bright red, globose, 6-10 mm. in diameter, subacid but very palatable.

Deep woods, Humid Transition and Canadian Zones; Aleutian Islands to California. In the Pacific States it is common from the lower altitudes of the Cascade Mountains to the coast of Washington and Oregon, extending southward to the Coast Ranges and the Sierra Nevada of central California. Type locality: "West Coast of North America," Menzies. May.

2. *OXYCÓCCUS* [Tourn.] Hill. Brit. Herb. 324. 1756.

Trailing or erect shrubs with glabrous or slightly pubescent branches. Leaves sessile or nearly so, alternate, persistent or deciduous. Flowers solitary or in small clusters, terminal or axillary, on long slender curved pedicels, bracteate and with or without 2 small bractlets on the pedicel. Corolla 4-5-cleft nearly to the base, the lobes narrow, spreading or reflexed in anthesis. Stamens twice as many as corolla-lobes and about equaling them in length, erect. Filaments stout, shorter than the anthers, pubescent. Anthers prolonged into very long tubes, without dorsal appendages. Ovary 4-5-celled, without false partitions; style slender; stigma capitate, adnate to the calyx-tube; fruit berry-like, many-seeded, red, juicy and acid. [Name Greek, meaning sour berry.]

A genus of about 6 species, widely distributed over the northern hemisphere. Type species, *Oxycoccus vulgarius* Hill.

1. *Oxycoccus palustris* Pers. Small or European Cranberry. Fig. 3746.*Vaccinium Oxycoccus* L. Sp. Pl. 351. 1753.*Oxycoccus palustris* Pers. Syn. Pl. 1: 419. 1805.*Oxycoccus Oxycoccus* MacM. Bull. Torrey Club 19: 15. 1892.

Trailing woody shrubs, with glabrous or slightly tomentose, filiform branches, rooting at the nodes. Leaves persistent, thick and coriaceous, scattered along the branches, 4-9 mm. long, ovate to elliptic, acute at the apex, rounded to subcordate or narrowed at base, strongly revolute-margined, dark green and shining above, glaucous beneath, glabrous; flowers strictly terminal, solitary or in clusters, on nodding or semierect pedicels; bractlets filiform or subulate; calyx-lobes rounded or acutish; corolla-segments 5 mm. long; filaments about half as long as the anthers; berry dark red, globose, 7-10 mm. in diameter.

Sphagnum bogs, Canadian Zone; of wide geographic range in the subarctic and cool-temperate regions, reaching our limits in northern Washington where it intergrades with the following variety. Type locality: Europe. June-Aug. Fruit, Sept.-Oct.

Oxycoccus palustris var. *intermedium* (A. Gray) Howell, Fl. N.W. Amer. 413. 1901. (*Vaccinium Oxycoccus* var. *intermedium* A. Gray, Syn. Fl. N. Amer. ed. 2: 396. 1886.) Distinguished from the typical



3738



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3738. *Vaccinium uliginosum*
 3739. *Vaccinium occidentale*
 3740. *Vaccinium caespitosum*

3741. *Vaccinium deliciosum*
 3742. *Vaccinium membranaceum*
 3743. *Vaccinium scoparium*

3744. *Vaccinium ovalifolium*
 3745. *Vaccinium parvifolium*
 3746. *Oxycoccus palustris*

species by the stout, densely leafy and finely tomentose branches. Leaves broadly elliptic, 6-15 mm. long, usually only slightly revolute; flowers in clusters, from scaly buds which appear axillary through the production of a leafy shoot from the same bud; corolla-lobes 6-8 mm. long. Sphagnum bogs, Canadian Zone; British Columbia southward in the coastal region to Lincoln County, Oregon, and in the Cascade Mountains to Marion County, Oregon. Type locality: "Washington Territory and N. Oregon."

Family 116. PRIMULACEAE.

PRIMROSE FAMILY.

Perennial or annual herbs, with alternate, opposite or basal, simple, exstipulate leaves. Flowers regular, typically 5-merous, varying from 3-9-merous, solitary in the axils or in terminal or axillary racemes, spikes, umbels or corymbs. Calyx herbaceous or rarely petaloid, 4-9-parted or -lobed, persistent or rarely deciduous. Corolla deeply parted or merely lobed, the lobes spreading or reflexed, or rarely connivent, contorted, imbricate or quincuncial in bud. Stamens 5, situated on the corolla-tube opposite the lobes. Ovary superior or half-inferior in *Samolus*, 1-celled; ovules on a basal or a free central axis. Style 1, simple; stigma capitate. Fruit a capsule, commonly 2-6-valved. Seeds few to many; endosperm present.

A family of 25 genera and about 600 species, of wide geographic distribution but most abundant in the northern hemisphere.

Ovary superior, entirely free from the calyx.

Stems elongated, leaf-bearing.

Capsule splitting into valves.

Corolla present; flowers not solitary and sessile in the axils.

Leaves scattered, opposite or whorled; flowers yellow.

Flowers 5-merous.

Staminodia none.

Staminodia 5, alternating with the 5 stamens.

Flowers 5-7-merous, in axillary spike-like racemes.

Leaves in a whorl-like cluster at the summit of the stem; flowers 5-7-merous, white or pink.

1. *Lysimachia*.

2. *Steironema*.

3. *Naumbergia*.

4. *Trientalis*.

Corolla none; calyx corolla-like; flowers solitary and sessile in the axils of fleshy leaves.

5. *Glaux*.

Capsule circumscissile; corolla pink or scarlet, rarely blue.

Leaves opposite; corolla scarlet, rarely blue.

Leaves alternate; corolla minute, shorter than the calyx-lobes, pink.

Stems very short; leaves forming a basal rosette; flowers borne on scapes in bracteate umbels.

Corolla-lobes spreading or erect.

Flowers showy; corolla-throat open, the lobes emarginate.

Flowers small; corolla-throat constricted.

Corolla-lobes entire or erose, the tube crested or fornicate within.

Corolla-lobes emarginate or obcordate, the throat not crested.

Corolla-lobes strongly reflexed.

6. *Anagallis*.

7. *Centunculus*.

8. *Primula*.

9. *Douglasia*.

10. *Androsace*.

11. *Dodecatheon*.

Ovary half-inferior, the lower portion adherent to the calyx; leaves scattered along the stem; flowers small, racemose.

12. *Samolus*.

1. *LYSIMACHIA* [Tourn.] L. Sp. Pl. 146. 1753.

Annual or mostly perennial herbs, with opposite, entire, often glandular-punctate leaves. Flowers solitary in the axils, or in racemes, corymbs or panicles. Calyx free from the ovary, persistent, parted or divided into 5-7-lobes. Corolla rotate or campanulate, 5-7-parted, the lobes convolute. Stamens 5-7, inserted on the corolla-throat; filaments distinct or connate at base; anthers oblong or oval; staminodia none. Ovary globose or ovoid, with few to several ovules; style filiform. Fruit a 2-5-valved, ovoid or globose capsule; seeds several. [Name Greek, meaning loosestrife.]

A genus of about 70 species mostly of the northern hemisphere, with a few in Australia and Africa. Type species, *Lysimachia vulgaris* L.

1. *Lysimachia Nummularia* L. Moneywort or Creeping Loosestrife. Fig. 3747.

Lysimachia Nummularia L. Sp. Pl. 148. 1753.

Glabrous perennial with creeping stems 2-6 dm. long, often rooting at the nodes. Leaves opposite, broadly ovate to orbicular, 15-25 mm. long, obtuse at both ends or subcordate at base, sparingly black-punctate; petioles 2-4 mm. long; flowers 1 or 2 in the axils, usually nodding; pedicels slender, 15-25 mm. long; sepals ovate-lanceolate, 6-7 mm. long, cordate at base; corolla yellow, deeply 5-parted, the lobes 7-10 mm. long, oblong-oval, black-dotted; filaments glandular, connate at base; capsule shorter than the sepals.

Growing in wet places, sparingly naturalized from Europe in the Pacific States; Willamette Valley, Oregon, and Quincy, Plumas County, California. Also naturalized in eastern United States and eastern Canada. June-Aug.

Lysimachia terrestris (L.) B.S.P. Prel. Cat. N.Y. 34. 1888. (*Viscum terrestre* L. Sp. Pl. 1023. 1753.)

Slender-stemmed erect perennials, 2–8 dm. high, with numerous opposite leaves and terminal bracteate racemes with yellow flowers streaked or dotted with purple. In cranberry marshes near the coast (Astoria, Seaside), Clatsop County, Oregon. Type locality: Philadelphia.

2. *STEIRONÈMA* Raf. Ann. Gén. Phys. 7: 192. 1820.

Perennial herbs, with opposite or whorled, simple entire leaves. Flowers axillary on slender spreading peduncles, often nodding. Calyx 5-parted, persistent, the segments valvate in bud. Corolla yellow, deeply 5-parted, rotate, without an evident tube, each corolla-lobe separately involute or convolute around its stamen, cuspidate or erose-denticulate. Stamens 5; filaments distinct or united into a ring at the base, granulose-glandular; anthers linear, curved in age; staminodia 5, alternating with the stamens, subulate. Ovary free from the calyx, globose; ovules few to many. Fruit a 5-valved capsule. Seeds few to many, margined or angled. [Name Greek, meaning sterile thread, in reference to the sterile stamens.]

A North American genus comprising 5 known species. Type species, *Lysimachia ciliatum* L.

1. *Steironema ciliatum* (L.) Raf. Fringed Loosestrife. Fig. 3748.

Lysimachia ciliata L. Sp. Pl. 147. 1753.

Steironema ciliatum Raf. Ann. Gén. Phys. 7: 192. 1820.

Steironema laevigatum Howell, Fl. N.W. Amer. 436. 1901.

Steironema ciliatum var. *occidentale* Suksd. Allg. Bot Zeit. 12: 26. 1906.

Perennial herb, with creeping rootstocks and erect simple or branched stems, 3–12 dm. high, nearly or quite glabrous. Leaves opposite, ovate to ovate-lanceolate, acuminate, obtuse to subcordate, pinnately veined, margins commonly short-ciliate; petioles conspicuously ciliate or rarely glabrous, 5–20 mm. long; flowers axillary, erect or nodding; peduncles slender, 2–6 cm. long; calyx-segments lanceolate, sharply acuminate, 6–8 mm. long; corolla yellow, rotate, the lobes 6–10 mm. long, erose and usually mucronate; capsule slightly exceeding the sepals.

Wet shady places, Transition and Upper Sonoran Zones; British Columbia to Nova Scotia, Arizona, New Mexico, Kansas, and Georgia. In the Pacific States mainly east of the Cascades but extending down the Columbia River (Sauvies Island and Scapoose, Oregon). Type locality: "Habitat in Virginia, Canada." June–Sept.

3. *NAUMBURGIA* Moench, Meth. Suppl. 23. 1802.

Erect perennial leafy herbs, with slender rootstocks. Leaves opposite, lanceolate, entire, sessile, the lower smaller or reduced to scales. Flowers yellow, in axillary peduncled racemes or heads. Calyx 5–7-parted, the sepals linear. Corolla deeply 5–7-parted with a very short tube and linear lobes. Stamens as many as corolla-lobes and opposite them, alternating with as many staminodia; filaments slender, glabrous, connate at the very base. Ovary round-ovoid; ovules few to many; style slender, equaling or exceeding the stamens; stigma capitate. Capsule 5–7-valved; seeds several, somewhat angled. [Name in honor of Johann Samuel Naumburg, European botanist of the eighteenth century.]

A monotypic genus of the north temperate zone. This and the preceding genus some botanists consider subgenera of *Lysimachia*.

1. *Naumburgia thyrsiflora* (L.) Duby. Tufted Loosestrife. Fig. 3749.

Lysimachia thyrsiflora L. Sp. Pl. 147. 1753.

Naumburgia guttata Moench, Meth. Suppl. 23. 1802.

Naumburgia thyrsiflora Duby in A. DC. Prod. 8: 60. 1844.

Glabrous or sparsely pubescent perennial, with simple erect stems 3–8 dm. high, often tufted. Upper leaves 5–10 cm. long, 1–2 cm. wide, lanceolate or oblong-lanceolate, acute to acuminate at apex, narrowed at base, the lower smaller and the lowest reduced to ovate scales, and often deciduous; peduncles solitary in the axils, 1.5–3 cm. long, rather stout; racemes spike-like, 1.5–2.5 cm. long; pedicels very short; sepals linear, 2–3 mm. long; petals linear, 5–6 mm. long, sparsely black-dotted; stamens and style exserted; capsule globose, slightly exceeding the sepals, black-dotted.

Lake borders and boggy meadows, Upper Sonoran and Transition Zones; Alaska to Nova Scotia, California, Montana, Missouri, and Pennsylvania; also Europe and Asia. In the Pacific States occurring locally in the Puget Sound region and eastern Washington, Oregon, and Plumas County, California. Type locality: Europe. May–Aug.

4. *TRIENTALIS* L. Sp. Pl. 344. 1753.

Small glabrous perennial herbs, with tuberous rootstocks and simple slender erect stems. Leaves mostly clustered in a verticil at the summit, lanceolate to ovate or oblong. Flowers few, terminal on slender peduncles, small, white or pink. Sepals 5–9, mostly 7, persistent. Corolla rotate, parted almost to the very base into 5–9 segments, these convolute in the bud. Stamens as many as corolla-lobes and opposite them; filaments connate at base; anthers linear-oblong, recurved after anthesis; staminodia none. Ovary globose; ovules numerous; style very slender. Capsule globose, 5-valved; seeds many, trigonal or spherical. [Name Latin, meaning one-third of a foot, in reference to the height of the plant.]

A genus of 4 species. Besides the following, *T. americana* Pursh occurs in eastern North America, and *T. europaea* L., the type species, in Europe and Asia. Our Pacific Coast species are most closely related to the Old World plants and are considered as varieties of them by some.

Leaves mostly obovate to oblanceolate, obtuse or rounded at apex, the larger rarely over 3.5 cm. long, rather loosely clustered at apex and scattered down the stem; pedicels longer than the leaves. 1. *T. arctica*.
Leaves mostly ovate to ovate-lanceolate, acute or acutish and then short-acuminate at apex, decidedly verticillate at apex, those scattered down the stem few, much-reduced, usually to setaceous scales; pedicels shorter than the leaves; flowers pale rose-pink. 2. *T. latifolia*.

1. *Trientalis arctica* Fisch. Arctic Starflower. Fig. 3750.

Trientalis arctica Fisch. ex Hook. Fl. Bor. Amer. 2: 121. 1838.

Trientalis europaea var. *arctica* Ledeb. Fl. Ross. 3: 25. 1847.

Alsinanthemum europaeum var. *latifolium* Greene, Man. Bay Reg. 238. 1894.

Trientalis europaea subsp. *arctica* Hultén, Klg. Sv. Vet. Akad. Handl. III. No. 2. 8: 56. 1930.

Stems solitary, simple, erect, 4–20 cm. high, glabrous below, glandular above as also the pedicels and petioles with minute purplish glands. Leaves at the apex approximate or verticillate, oblanceolate to obovate, 2.5–4 cm. long, tapering to a short petiole, obtuse at apex, entire or often undulate-crenate, those scattered along the stem similar but more or less reduced; pedicels mostly exceeding the leaves; calyx-lobes linear, acuminate, 3–4 mm. long; corolla white, rarely pink, 10–18 mm. broad, the lobes ovate, acuminate or mucronate or mucronate at apex.

Bogs and swamps, Boreal and Humid Transition Zones; Aleutian Islands and Behring Straits south along the Pacific Slope to Curry and Wasco Counties, Oregon; also in eastern Siberia and Kamchatka. Type locality: Unalashka. June–July.

2. *Trientalis latifolia* Hook. Pacific Starflower. Fig. 3751.

Trientalis latifolia Hook. Fl. Bor. Amer. 2: 121. 1838.

Trientalis europaea var. *latifolia* Torr. Pacif. R. Rep. 4: 118. 1857.

Stems slender, erect, 5–20 cm. high, simple or very rarely with an adventitious branchlet, brownish glandular above as also the petioles and pedicels. Leaves mostly 4–7 in the apical verticil, broadly to narrowly ovate, very rarely somewhat obovate, 4–8 cm. long, 2–5.5 cm. wide, acute or acuminate at apex, rather abruptly narrowed at base to a short (1–5 mm.) petiole, those scattered down the stem usually reduced to setaceous scales; pedicels shorter than the leaves, calyx-lobes linear to lanceolate, 4–6 mm. long; corolla pale rose-pink, 8–15 mm. broad, the lobes ovate, usually mucronate and sometimes erose-denticulate.

Shaded banks and deep woods, mainly Humid Transition Zone; Vancouver Island and western Washington (extending up the Columbia to Klickitat County), south to San Luis Obispo and Mariposa Counties, California. Type locality: "About Fort Vancouver. Wallawallah River." April–July.

5. *GLAUX* [Tourn.] L. Sp. Pl. 207. 1753.

A small succulent perennial herb, with small opposite fleshy entire leaves and minute axillary dimorphous flowers. Calyx petaloid, 5-lobed, the campanulate tube about equaling the lobes. Corolla none. Stamens 5, inserted at the base of the calyx-tube and alternate with the lobes; filaments subulate; anthers attached dorsally to the filaments, cordate. Ovary free from the calyx, ovoid; ovules few; style filiform; stigma capitate. Capsule globose-ovoid; beaked by the persistent style, 5-valved at the apex; seeds few, ellipsoid. [Name Greek, meaning sea-green.]

A monotypic genus inhabiting moist saline soils, and widely distributed over the northern hemisphere.

1. *Glaux maritima* L. Sea Milkwort or Black Saltwort. Fig. 3752.

Glaux maritima L. Sp. Pl. 207. 1753.

Glaucoides maritima Lunell, Amer. Midl. Nat. 4: 505. 1916.

Perennial herb with slender rootstocks, and glabrous usually glaucous herbage, the stems slender, simple or well-branched, erect or tufted, 4–25 cm. high. Leaves fleshy, sessile, oval to linear-oblong, 4–10 mm. long, obtuse to acutish at apex; flowers sessile or nearly so, about 3–4 mm. high; calyx-lobes broadly elliptic, about as long as the tube; capsule 2.5 mm. high.

Moist saline situations, Boreal Zones to Upper Sonoran Zone; Alaska to Newfoundland, south to California, Utah, Nebraska, and New Jersey. In the Pacific States it occurs in coastal salt marshes from Vancouver Island and western Washington to central California, also in alkaline soils of eastern Washington and eastern Oregon. Type locality: Europe. May–July.

6. *ANAGALLIS* [Tourn.] L. Sp. Pl. 148. 1753.

Annual or perennial, diffusely branching herbs. Leaves usually entire, opposite or verticillate, sessile or short-petioled. Flowers small, solitary on axillary peduncles. Calyx persistent, 5-parted. Corolla deeply 5-parted, rotate. Stamens 5, inserted at the base of the corolla; filaments puberulent, distinct or united into a narrow ring at base; anthers oblong. Ovary globose; style filiform; stigmas subcapitate. Capsule globose, circumscissile; seeds numerous, angled. [Name Greek, meaning delightful.]

About 15 species, inhabiting Europe, western Asia, northern and southern Africa and one species South America. Type species, *Anagallis arvensis* L.

1. *Anagallis arvensis* L. Scarlet Pimpernel. Fig. 3753.*Anagallis arvensis* L. Sp. Pl. 148. 1753.

Diffusely branched usually glabrous annual, the branches 1-3 dm. long, 4-sided. Leaves opposite or rarely ternate, sessile or clasping, broadly ovate to oval, 5-20 mm. long; peduncles very slender, 1-3 cm. long, recurved in fruit; calyx-lobes lanceolate, acuminate, 3-5 mm. long, keeled; corolla rotate, scarlet, usually with a violet center, sometimes white, 4-7 mm. broad; capsule glabrous, about 3-4 mm. in diameter.

A field and garden weed, native of the Old World; common in central and southern California, less so in western Oregon as far north as Portland, but so far not definitely reported from Washington. Flowering nearly the year round.

Anagallis arvensis var. *coerulea* (Lam.) Ledeb. Fl. Ross. 3: 30. 1847. Flowers blue and in cultivated forms usually larger. Occasionally growing spontaneously in California.

7. *CENTUNCULUS* [Dill.] L. Sp. Pl. 116. 1753.

Low glabrous annual herb, with erect or ascending, simple or branched stems. Leaves small, alternate or the lowest opposite, sessile or subsessile. Flowers minute, solitary in the axils. Calyx 4-5-parted, persistent, the lobes exceeding the 4-5-lobed marcescent corolla. Stamens 4-5, inserted on the throat of the corolla; filaments short, distinct, glabrous; anthers ovate or cordate. Style filiform; stigma capitate; ovary globose; ovules numerous. Capsule globose, circumscissile; seeds many, minute, angled. [Name Latin, diminutive of *cento*, a patch.]

A genus of 3 species with wide geographical range. Type species, *Centunculus minimus* L.

1. *Centunculus minimus* L. Chaffweed or False Pimpernel. Fig. 3754.*Centunculus minimus* L. Sp. Pl. 116. 1753.

Plants usually branched, the branches ascending or decumbent, 3-15 cm. high. Leaves spatulate to broadly obovate or oblong, rounded to acutish at apex, short-petioled, 3-8 mm. long; flowers sessile or subsessile, shorter than the leaves; calyx-lobes 4, linear-lanceolate, acuminate, 3 mm. long; corolla pink, shorter than the calyx, 4-lobed, marcescent; capsule globose, shorter than the calyx-lobes, circumscissile near the middle.

Moist places, Transition and Sonoran Zones; British Columbia to Minnesota, Illinois, California, Texas, Florida, and Mexico; also South America and Europe. In the Pacific States it is locally but widely distributed from northeastern Washington and eastern Oregon to southern California. Type locality: Europe. April-July.

8. *PRÍMULA* L. Sp. Pl. 142. 1753.

Herbs with perennial rhizomes, basal leaves, scapose stems and small or usually showy dimorphous flowers in umbels or in racemose involucrate or bracteate whorls terminating the scapes. Calyx 5-parted, the lobes imbricate, persistent. Corolla funnel-form or salverform, the lobes imbricate, entire, emarginate or 2-cleft. Stamens 5, with very short filaments inserted on the tube or throat; anthers oblong, obtuse. Ovary free from the calyx, globose or ovoid; style filiform; stigma capitate. Capsule oblong to globose, 5-valved at the summit; seeds many, peltate, punctate.

A genus of about 150 species, mostly of the northern hemisphere, but a few inhabit Java and the Straits of Magellan. Type species, *Primula veris* L.

Plants with a very short caudex and numerous fibrous roots; leaves not dentate at apex; umbels 2-flowered.

1. *P. Cusickiana*.

Plants with an elongated woody caudex; leaves conspicuously dentate at apex; umbels several-flowered.

2. *P. suffrutescens*.

1. *Primula Cusickiana* A. Gray. Cusick's Primula or Wallowa Primrose. Fig. 3755.*Primula angustifolia* var. *Cusickiana* A. Gray, Syn. Fl. N. Amer. 2¹: 393. 1878.*Primula Cusickiana* A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 399. 1886.

Plants with 1 to several very short caudices from a tuft of fibrous roots. Basal leaves oblong-spatulate, 3-5 cm. long, entire or undulate and obscurely denticulate, glabrous; scapes 3-15 cm. high, 2-4-flowered; involucre bracts 2-3, 4-5 mm. long; calyx green, 6-7 mm. long, the lobes lanceolate, acuminate, a little longer than the tube; corolla violet-purple, rarely white with yellowish tube, the tube slightly exceeding the calyx-lobes, the lobes about 5 mm. long and nearly as broad, retuse at apex.

Rocky moist places, Boreal Zones; Union and Wallowa Counties, northeastern Oregon to Idaho. Type locality: rocky hills, Union County, Oregon. March-April.

2. *Primula suffrutescens* A. Gray. Sierra Primula or Primrose. Fig. 3756.*Primula suffrutescens* A. Gray, Proc. Amer. Acad. 7: 371. 1868.

Stems suffrutescent and branching. Leaves crowded, 15-35 mm. long, spatulate and gradually narrowed to a winged petiole, dentate on the rounded apex, rather thick, glabrous; scapes 4-10 cm. high, the upper part together with the pedicels and calyces minutely glandular-puberulent;



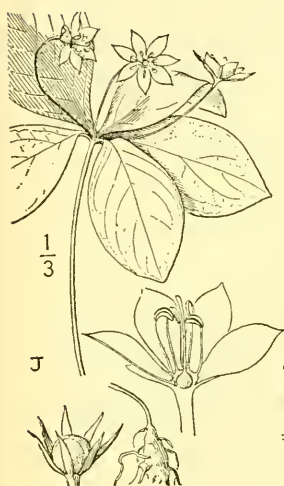
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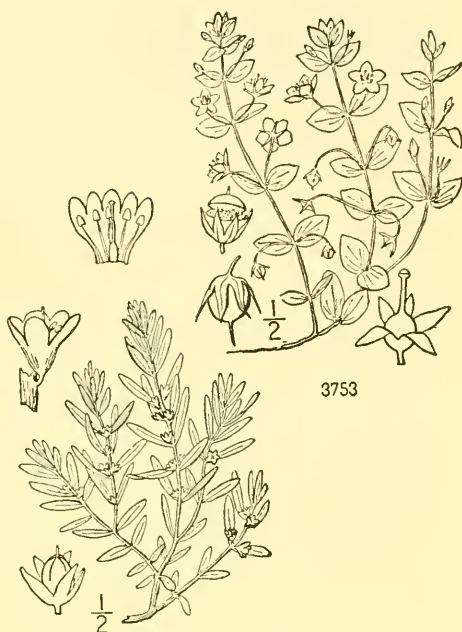
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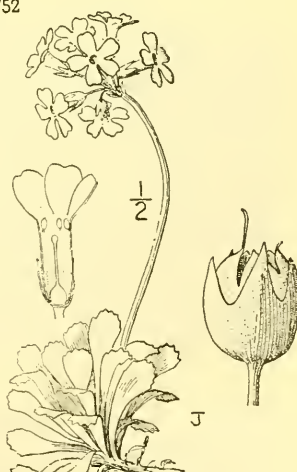
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3747. *Lysimachia nummularia*
3748. *Steironema ciliatum*
3749. *Naumburgia thyrsoiflora*
3750. *Trientalis arctica*

3751. *Trientalis latifolia*
3752. *Glaux maritima*
3753. *Anagallis arvensis*

3754. *Centunculus minimus*
3755. *Primula cusickiana*
3756. *Primula suffrutescens*

umbels 2-9-flowered, subtended by several lanceolate-subulate bracts; calyx 6-8 mm. long, the lanceolate lobes much longer than the tube; corolla red-purple, the tube 8-10 mm. long, the lobes about the same length, obovate, emarginate or obcordate; capsule ovoid a little shorter than the calyx.

Rock crevices, at high altitudes, Boreal Zones; Coast Ranges, Trinity County, and the Sierra Nevada, from Plumas County to Tulare County, California. Type locality: Silver Mountain, Sierra Nevada, altitude 10,500 feet, California. July-Aug.

9. *DOUGLÁSIA* Lindl. Brande Quart. Journ. Sci. 385. 1827.

Small caespitose herbs, the stems branching and somewhat suffrutescent. Leaves small, linear, imbricated, forming rosettes at the ends of the branches, withering-persistent, glabrous or canescent with forked hairs. Peduncles solitary or several from the terminal rosettes, bracteate. Flowers terminal, solitary or in a bracteate umbel or fascicle. Calyx 5-lobed to near the middle. Corolla pink to violet, funnellform, 5-lobed, the lobes oblong-obovate, imbricate in the bud, the tube 5-fornicate within. Stamens 5, attached to the corolla-tube; filaments short; anthers oblong. Style filiform; stigma capitate; ovary 1-celled; ovules many, anatropous. Capsule subglobose, 5-valved to the base; seeds 2 or 3 by abortion, oval to orbicular, flat or concave ventrally, finely pitted. [Name in honor of the intrepid plant explorer, David Douglas.]

A genus of 4 or 5 species, natives of northwestern North America. Type species, *Douglasia nivalis* Lindl.

Leaves stellate-pubescent.

1. *D. nivalis*.

Leaves glabrous or sometimes ciliate on the margins.

2. *D. laevigata*.

1. *Douglasia nivalis* Lindl. Snow Douglasia. Fig. 3757.

Douglasia nivalis Lindl. Brande Quart. Journ. Sci. 385. 1827.

Douglasia dentata S. Wats. Proc. Amer. Acad. 17: 375. 1882.

Douglasia nivalis var. *dentata* A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 399. 1886.

Androsace Dieckmana Hausskn. Mitt. Bot. Ver. Gesamthüring. 9: 22. 1890.

Primula nivalis Kuntze, Rev. Gen. Pl. 2: 400. 1891.

Gregoria nivalis House, N.Y. State Mus. Bull. Nos. 233-234: 68. 1921.

Low caespitose perennial, more or less canescent with a fine permanent stellate pubescence. Leaves in rather remote rosette-like whorls, becoming somewhat reflexed, linear-oblong to oblanceolate, 5-15 mm. long, entire or more or less dentate; peduncles 1-5 cm. long, bearing a bracteate several-flowered umbel; bracts 3-10, lanceolate; flowers mostly 3-10, on pedicels of unequal length; calyx campanulate, 6-7 mm. long, the lobes narrowly lanceolate, slightly exceeding the scarious tube; corolla rose-purple, the tube about equaling the calyx-lobes, the lobes 3-4 mm. long, obovate, entire or erose.

Rocky ridges and talus slopes, Hudsonian Zone; Rocky Mountains of British Columbia and Alberta; also in the Wenatchee Mountains of Chelan and Kittitas Counties, Washington. Type locality: Canadian Rockies, "in latitude 52 N., longitude 118 W., at an estimated elevation of 12,000 feet." April-Oct.

2. *Douglasia laevigata* A. Gray. Cliff Douglasia. Fig. 3758.

Douglasia laevigata A. Gray, Proc. Amer. Acad. 16: 105. 1880.

Primula laevigata Derganc, Allg. Bot. Zeit. 10: 111. 1904.

Gregoria laevigata House, N.Y. State Mus. Bull. Nos. 233-234: 69. 1921.

Douglasia laevigata var. *ciliolata* Constance, Amer. Midl. Nat. 19: 254. 1938.

Low caespitose perennial, from a slender taproot. Leaves oblong to spatulate, 5-15 mm. long, usually in less distant whorls, glabrous, rather thick, the margins entire, without cilia or with a few inconspicuous ones toward the base, or, especially in the Olympic Mountains, decidedly ciliate along the entire margin; peduncles and pedicels minutely stellate-puberulent; involucre bracts 3-7, lanceolate to broadly ovate; pedicels 2-6, unequal in length; calyx 5-6 mm. long, the lobes slightly longer than the tube; corolla pink, the tube a little exceeding the calyx, the lobes obovate, entire or often erose.

Rocky slopes and cliffs, Humid Transition Zone to Hudsonian Zone; Olympic Mountains, and Mount Hamilton and Goat Mountain in the Cascades, Washington, and along Columbia River (Mitchell Point), Oregon. Type locality: "mountains near Mt. Hood," Oregon. April-Sept.

10. *ANDRÓSACE* [Tourn.] L. Sp. Pl. 141. 1753.

Small annual or perennial herbs of various habits, ours annuals with basal rosulate leaves and slender scapes, bearing involucre umbels of small flowers. Calyx 5-lobed, the tube becoming scarious. Corolla salverform, with a short tube, constricted throat, and obcordate or emarginate lobes. Stamens 5, included, the filaments short; anthers oblong. Ovary globose or turbinate; styles short; ovules few to many, oblong to suborbicular,

compressed dorsally, rugulose. [Ancient Greek name for some sea plant or zoophyte, curiously transferred.]

A genus of about 60 species of the northern hemisphere, more abundant in Eurasia than in North America. Type species, *Androsace maxima* L.

Plants with numerous fibrous roots, glabrous; calyx hemispheric; capsule globose, well exceeding the calyx.

1. *A. filiformis*.

Plants with a single taproot, more or less puberulent with forked hairs; calyx-tube obpyramidal; capsule ovoid, shorter than the calyx.

Corolla shorter than the calyx, the lobes less than 1 mm. long, erect.

Involucral bracts ovate to obovate-oblongate; calyx-lobes triangular-lanceolate, merely acute at apex.

2. *A. occidentalis simplex*.

Involucral bracts lanceolate-subulate, ending in a prominent apiculation.

3. *A. acuta*.

Corolla exceeding the calyx, the lobes over 1 mm. long, spreading in anthesis.

4. *A. septentrionalis subumbellata*.

1. *Androsace filiformis* Retz. Slender *Androsace*. Fig. 3759.

Androsace filiformis Retz. Obs. 2: 10. 1781.

Androsace capillaris Greene, Pittonia 4: 148. 1900.

Glabrous annual, with a tuft of several to many fibrous roots. Leaves in a basal rosette, ovate to ovate-lanceolate, entire or denticulate, 7–15 mm. long, narrowed at base to a petiole of about the same length; scapes 1 to several, 3–10 cm. high; bracts lanceolate-subulate, 1–1.5 mm. long; pedicels few to many, 1–5 cm. long; calyx hemispheric, 2.5–3 mm. long, the teeth triangular, 3-nerved, flat; corolla white, exceeding the calyx, the lobes broadly oval, 1 mm. long, reflexed; capsule globose, exceeding the calyx; seeds globose, finely tuberculate.

Wet places, Boreal and Transition Zones; northern Eurasia and northwestern North America, extending as far south as Oregon, Utah and Colorado, western and southwestern Washington and adjacent Oregon. Type locality: Siberia. June–Aug.

2. *Androsace occidentalis* var. *simplex* (Rydb.) St. John. Western *Androsace*. Fig. 3760.

Androsace simplex Rydb. Bull. Torrey Club 40: 462. 1913.

Androsace occidentalis var. *simplex* St. John, Victoria Mus. Mem. No. 126: 53. 1922.

Annual from a slender taproot. Leaves in a basal rosette, oblanceolate, sessile or with a short winged petiole, 5–10 mm. long; scape solitary, 2–4 cm. high; bracts oblanceolate to oval, 2–5 mm. long; pedicels 1–4, erect, 5–15 mm. long; calyx-tube 2 mm. long, scarious, the lobes lanceolate, acute, equaling the tube, dark green, puberulent; corolla much shorter than the calyx, the lobes 0.5 mm. long, erect.

Talus slopes and flats, Arid Transition and Boreal Zones; British Columbia to Alberta and Utah. Known in the Pacific States only from Emigrant Gap, Sierra Nevada, California. Type locality: Missoula, Montana. April–Sept.

3. *Androsace acuta* Greene. California *Androsace*. Fig. 3761.

Androsace acuta Greene, Man. Bay Reg. 238. 1894.

Androsace asprella Greene, Pittonia 4: 150. 1900.

Androsace occidentalis var. *acuta* Jepson, Man. Fl. Pl. Calif. 755. 1925.

Androsace elongata subsp. *acuta* Robbins, Amer. Midl. Nat. 32: 154. 1944.

Annual with a slender taproot, rather densely puberulent throughout with forked hairs. Leaves in a basal rosette, linear-lanceolate, attenuate-acute, sessile or narrowed to a short winged petiole, entire, 8–16 mm. long, ciliate with short stiff hairs on the margins; scapes about 1–6, erect or ascending, 2–4 cm. high; bracts linear, 3–5 mm. long, attenuate at apex to a sharp apiculation, ciliate on the margins; pedicels mostly 3–6, ascending or the outer widely spreading and curved upward, 1.5–4.5 cm. long; calyx-tube obpyramidal, 2 mm. high, scarious, the lobes about equaling the tube, narrowly triangular-subulate, with rather broad sinuses, attenuate at apex to a sharp apiculation, green below, reddish toward the apex; corolla shorter than the calyx, the lobes becoming erect, scarcely 1 mm. long.

Mostly on north-facing slopes, Upper Sonoran Zone; Rogue River Valley, Oregon, and California Coast Ranges, from Contra Costa County to San Diego County. Type locality: "northward slopes of the hills, Contra Costa and Alameda Counties," California. March–May.

4. *Androsace septentrionalis* var. *subumbellata* A. Nels. Northern *Androsace*. Fig. 3762.

Androsace septentrionalis var. *subumbellata* A. Nels. Wyo. Exp. Sta. Bull. No. 28: 149. 1896.

Androsace subumbellata Small, Bull. Torrey Club 25: 319. 1898.

Annual from a taproot, more or less puberulent throughout. Leaves in a dense basal rosette, narrowly oblanceolate, 8–20 mm. long, sessile or narrowed to a short, winged petiole; scapes 1 to several, shorter to slightly longer than the leaves; bracts subulate, 2–3 mm. long; pedicels 1–6, erect or ascending, 1–3 cm. long; calyx-lobes lanceolate, acute, about 1 mm. long; corolla well-exceeding the calyx, the lobes over 1 mm. long, spreading in anthesis.

Open slopes, usually in gravelly soils, Boreal Zones; British Columbia to Alberta, and southward to New Mexico. In the Pacific States it has been collected in the Wallowa Mountains, Oregon, and the Sierra Nevada, White and San Bernardino Mountains, California. Type locality: "grassy hillside near the summit of Union Peak," Wyoming. May–Sept.

11. *DODECÁTHEON* L. Sp. Pl. 144. 1753.

Glabrous or glandular-puberulent, scapose perennials, with a short rootstock producing fleshy-fibrous roots. Leaves basal, narrowly oblanceolate to broadly obovate, entire or repand. Flowers in an involucrate umbel, terminating the scape, 4-5-merous. Calyx persistent, deeply lobed, the lobes reflexed in flower, erect after anthesis. Corolla deeply lobed, the lobes imbricate in the bud, strongly reflexed in flower. Stamens exserted, the filaments short and broad, often united into a tube; anthers attached at base, mostly erect and approximate. Pistil 1, with a single style and a capitate stigma; ovary 1-celled; ovules many, half-anatropous. Capsule partially 5-valved, the valves splitting into the base of the style, or the capsule circumscissile a short distance below the style and then splitting into valves, thus leaving the tips of the valves truncate instead of acutely pointed. Seeds numerous. [Greek, meaning twelve gods, the name used by Pliny and Theophrastus for a different plant.]

A North American genus of approximately 30 species, all but the type species inhabit the western part of the continent. Type species, *Dodecatheon Meadia* L.

Anthers sessile or subsessile, filaments when present not over 0.5 mm. long, distinct.

Leaves sharply dentate, the petioles slender, much exceeding the blades; flowers white.

1. *D. dentatum*.

Leaves entire or callous-denticulate, more commonly shallowly crenate with the callosity in the sinus; flowers rose-purple.

Leaves oblanceolate or linear-oblanceolate, tapering at the base to a broad winged petiole; capsule ovoid; flowers 4-5-merous.

Plants more or less glandular-puberulent at least on the pedicels and calyces; leaves oblanceolate, 15-40 cm. long.

2. *D. Jeffreyi*.

Plants (usually) glabrous; leaves linear to linear-oblanceolate, 5-15 cm. long.

3. *D. alpinum*.

Leaves ovate to spatulate, abruptly narrowed at the base to a rather slender elongated petiole; capsule cylindric; flowers 5-merous.

4. *D. conjugens*.

Anthers borne on filaments, these united into a tube 1-3 mm. long.

Capsule dehiscent from the apex, splitting into the base of the style, the valves thus acute.

Leaves and stems glandular-pubescent; filament-tube yellow.

5. *D. Cusickii*.

Leaves glabrous, upper part of stems and pedicels often puberulent; filament-tube yellow in the typical species, dark purple in the variety.

6. *D. pauciflorum*.

Capsule circumscissile a short distance below the style, thus leaving the apex of the valves truncate.

Filament-tube slender, dark purple; anthers linear-lanceolate acute.

Leaves and stems puberulent.

7. *D. poeticum*.

Leaves glabrous.

Leaves narrowly oblanceolate or spatulate; pedicels and calyces glabrous; capsule subcylindric.

8. *D. subalpinum*.

Leaves ovate to orbicular-ovate; pedicels and calyces more or less glandular-puberulent except in variety *Hansenii*; capsule ovoid.

9. *D. Hendersonii*.

Filament-tube stout, nearly as broad as long; anthers oblong, rounded or obtuse at apex.

Plants rarely over 5-10 cm. tall in the typical species, often 15-20 cm. in the variety; anthers 2-3 mm. long, upper part of the connective dark purple, the base broad, much wrinkled, often yellow.

10. *D. patulum*.

Plants mostly 20-30 cm. tall; anthers 4-6 mm. long, connective cream-yellow and the pollen-sacs with a dorsal purple stripe in the typical species, but in the variety, connective dark purple and the pollen-sacs cream-yellow throughout.

11. *D. Clevelandii*.

1. *Dodecatheon dentatum* Hook. White Shooting Star. Fig. 3763.

Dodecatheon dentatum Hook. Fl. Bor. Amer. 2: 119. 1838.

Dodecatheon Meadia var. *latilobum* A. Gray, Syn. Fl. N. Amer. 2: 58. 1878.

Dodecatheon frigidum var. *dentatum* A. Gray, Bot. Gaz. 11: 234. 1886.

Dodecatheon latilobum Elmer ex R. Knuth, Pflanzenreich 42²⁷: 239. 1905.

Plants glabrous throughout, with slender rootstocks and mostly elongated slender roots. Leaves 5-50 cm. long including the petiole, the blades ovate and acute to oval and obtuse, 2.5-7 cm. long, 2-5 cm. broad, dentate to denticulate, thin, abruptly narrowed to a comparatively slender petiole as long as or much longer than the blade; scapes 15-30 cm. high; umbels 1-6-flowered; flowers 5-merous; corolla-lobes white with 1 or usually 2 purple dots at the base of each, 15-20 mm. long; stamens with very short distinct filaments; anthers 5-6 mm. long, tapering from the base to an acute apex, purple; capsule narrowly ovoid, 5-7 mm. long, dehiscent by 5 terminal valves.

Shady wet places usually along streams, Transition and Canadian Zones; British Columbia to Oregon, Idaho, and Utah. In Washington it has been collected in Okanogan, Chelan, Kittitas, and Skamania Counties; in Oregon, on bluffs along the Columbia Gorge. Type locality: "N.W. interior." Collected by Douglas. May-June. White Birdbill.

2. *Dodecatheon Jeffreyi* Van Houtte. Jeffrey's Shooting Star. Fig. 3764.

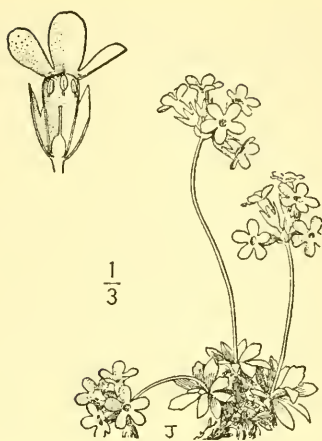
Dodecatheon Jeffreyi Van Houtte, Fl. Serres 16: 99. pl. 1682. 1865.

Dodecatheon glandulosum Eastw. Leaflets West. Bot. 2: 36. 1937.

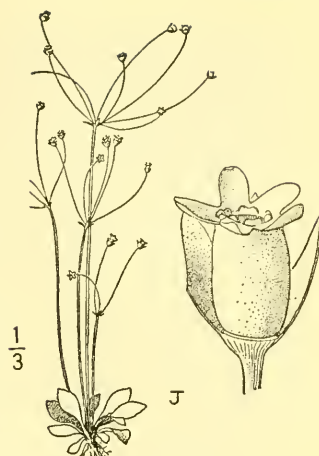
Plants with a short rootstock, producing many fleshy roots and sometimes bulblets. Leaves oblanceolate, acute or obtuse, or even rounded at apex, gradually narrowed below to a winged petiole, 7-25 cm. long, 1-3.5 cm. broad, entire or remotely denticulate, glabrous or obscurely and scatteringly glandular-puberulent; scapes 35-60 cm. high, glandular-puberulent especially



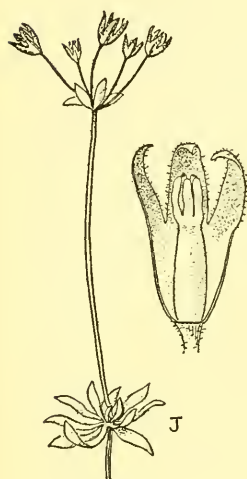
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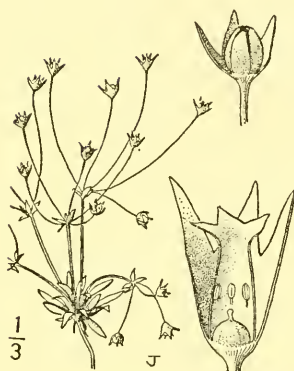
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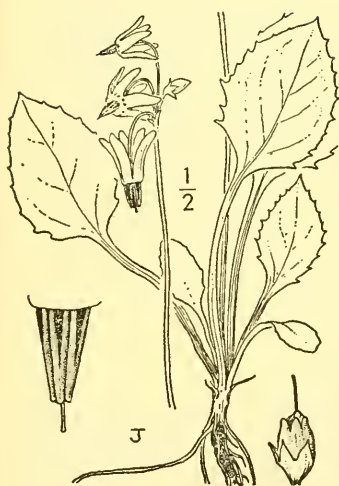
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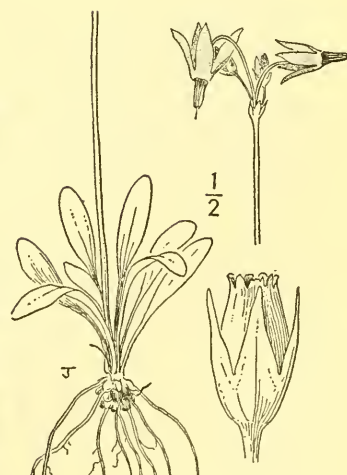
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3765

3757. *Douglasia nivalis*
3758. *Douglasia laevigata*
3759. *Androsace filiformis*

3760. *Androsace occidentalis*
3761. *Androsace acuta*
3762. *Androsace septentrionalis*

3763. *Dodecatheon dentatum*
3764. *Dodecatheon Jeffreyi*
3765. *Dodecatheon alpinum*

above; umbels usually many-flowered, the pedicels and calyx glandular-puberulent; flowers 4-5-merous; calyx-lobes narrowly lanceolate, acuminate, 6-7 mm. long; corolla-lobes 15-25 mm. long, rose-pink, pale and often yellowish toward the base, closely reflexed exposing the dark purple band of the throat; anthers reddish purple, 8-9 mm. long, gradually narrowing from the base to the acute apex; filaments very short or obsolete; capsule broadly ovoid about equaling the calyx-lobes.

Wet meadows, Transition and Boreal Zones; British Columbia, Idaho, eastern Washington, and eastern Oregon to southern California. Type locality: "Montagnes-Rocheuses." June-Aug.

Dodecatheon Jeffreyi var. *viviparum* (Greene) Abrams. (*Dodecatheon crenatum* Greene, Pittonia 2: 74. 1890. Not Raf. 1833; *D. viviparum* Greene, Erythea 3: 38. 1895.) Plants thinly glandular-puberulent; leaves 8-25 cm. long, 2.5-4.5 cm. wide, mostly rounded or obtuse at apex, gradually or more often rather abruptly narrowed to the scarcely or not at all winged petiole, the margin often rather obscurely crenate, with a callous in the notch between the teeth; flowers 5-merous; corolla strongly reflexed as in the typical species. Bogs and wet meadows, Boreal Zones; Cascade and Olympic Mountains, Washington, and Mount Hood, Oregon. Type locality: "at a little below the limit of trees on Mt. Rainier, Washington."

Dodecatheon Jeffreyi var. *redolens* Hall, Bot. Gaz. 31: 392. 1901. Herbage rather glandular-puberulent and redolent with a strong odor; flowers mostly 5-merous; corolla folding back about half-way up the corolla-tube thus including the lower part of the stamens and capsule within the cup-like lower part of the tube, and this without a purple band at the base. Blue Mountains, northeastern Oregon; White Mountains and the central Sierra Nevada to San Jacinto Mountains, California; Ruby and Toiyabe and Charleston Mountains, Nevada. Type locality: "along the lakes at the base of Mt. Goddard, 3,400 m.," Sierra Nevada, California.

3. *Dodecatheon alpinum* (A. Gray) Greene. Alpine Shooting Star. Fig. 3765.

Dodecatheon ellipticum Nutt. ex Durand, Journ. Acad. Phila. II. 3: 94. 1855. As to Nuttall's type, not Raf. 1832.

Dodecatheon Meadia var. *alpinum* A. Gray, Bot. Calif. 1: 467. 1876.

Dodecatheon alpinum Greene, Erythea 3: 39. 1895.

Dodecatheon tetrandrum Suksd. ex Greene, op. cit. 40.

Plants with a definite, often bulbiferous rootstock, glabrous throughout. Leaves linear-oblanccolate, 3-15 cm. long, 5-12 mm. wide, obtuse or rounded at apex, entire; scape slender, 10-30 cm. high; flowers 1 to several in the umbel, 4-merous, rarely 5- or 6-merous; calyx-tube 2 mm. long, the lobes 3-4 mm. long, lanceolate, acute; corolla rose-purple, the lobes lanceolate, 10-15 mm. long; anthers subsessile, linear, 7 mm. long, the connective deep purple, smooth; capsule oblong-ellipsoid, 7-8 mm. long, splitting into valves from the apex.

Wet meadows and springs, Boreal Zones; Cascade Mountains, Washington, to the San Jacinto Mountains, southern California, east to Nevada and Utah. Type locality: high Sierra Nevada, California. May-Aug.

4. *Dodecatheon conjugens* Greene. Bonneville Shooting Star. Fig. 3766.

Dodecatheon conjugens Greene, Erythea 3: 40. 1895.

Dodecatheon glastifolium Greene, op. cit. 71.

Dodecatheon campestre Howell, Fl. N.W. Amer. 432. 1897.

Dodecatheon Hendersonii var. *leptophyllum* Suksd. Deutsch. Bot. Monatss. 18: 132. 1900.

Dodecatheon conjugens subsp. *leptophyllum* Piper, Contr. U.S. Nat. Herb. 11: 446. 1906.

Plants glabrous throughout, with a short erect crown producing fleshy-fibrous roots. Leaves obovate to oblong-oblanccolate, rounded to acutish at apex, narrowed to a distinct petiole about equaling the blade, 5-10 cm. long including the petiole, 1-25 cm. wide; scapes rather stout, 10-20 cm. high; flowers 1-3, rarely more in the umbel, 5-merous; corolla deep purple varying to rose-purple or rarely white, tinged with yellow at the base of the lobes, these 15-20 mm. long; anthers sessile, distinct, 6 mm. long, dark purple; capsule cylindric, 8-12 mm. long, circumscissile below the apex then splitting into valves; seeds broadly ellipsoid, slightly flattened, brown.

Moist slopes and thickets, Arid Transition Zone; Chelan County, Washington, to Lassen County, California, and Steen Mountains, southeastern Oregon, east to Montana and Wyoming. Type locality: "My first specimens were from Prof. Kelsey, who obtained them on dry hills near Helena, Montana. Better material is now in hand collected in southeastern Oregon, in 1893, by Mrs. R. M. Austin." It is obvious from this statement that Mrs. Austin's specimen is the type and therefore the type locality is "southeastern Oregon." March-May.

Dodecatheon conjugens var. *viscidum* (Piper) H. L. Mason ex St. John, Fl. S.E. Wash. 311. 1937. (*D. viscidum* Piper, Bull. Torrey Club 28: 43. 1901.) Whole plant, including calyx and capsule, glandular-puberulent; capsule cylindric, narrow, 10-15 mm. long, circumscissile near the apex. In describing this species Professor Piper wrote: "collected by the writer ten miles west of Spangle, Wash. 24 May 1898. The plant was found on a grassy hillside in one spot only, and is apparently very rare." Subsequent collections have been made by Suksdorf on "damp low ground near Spangle." These specimens are dated April 26, May 17, and June 30, 1916.

5. *Dodecatheon cusickii* Greene. Columbia or Sticky Shooting Star. Fig. 3767.

Dodecatheon Meadia var. *puberula* Nutt. Journ. Acad. Phila. 7: 48. 1834.

Dodecatheon Cusickii Greene, Pittonia 2: 73. 1890.

Dodecatheon puberulentum Heller, Bull. Torrey Club 24: 311. 1897.

Dodecatheon pauciflorum Piper, Contr. U.S. Nat. Herb. 11: 445. 1906.

Dodecatheon pauciflorum var. *Cusickii* H. L. Mason ex St. John, Fl. S.E. Wash. 312. 1937.

Plants low and slender, 15-30 cm. high, glandular-pubescent throughout. Leaves, including the petiole, 6-9 cm. long, oblanccolate to almost oval, obtuse or rounded at apex, narrowed at base to the slender petiole of about equal length, entire or sometimes toothed; umbels few-flowered; corolla 10-15 mm. long, with a sinuous purple line at base and a yellow band above; the lobes rose-purple to lavender; filament-tube yellowish, about half as long as the anthers; connectives narrowly wedge-shaped at base, dark purple, smooth or nearly so, pollen-sacs cream-yellow or sometimes purplish, dorsally; capsule sub-cylindric, acute at apex, 6-8 mm. long, glabrous, dehiscent through the styles leaving the ends of the valves acute.

Usually on moist banks or slopes, mainly Arid Transition Zone; British Columbia southward east of the

Cascades through eastern Washington to northern Oregon and Idaho. Type locality: "dry mountain ridges of eastern Oregon, at an altitude of 4000 feet." March-May.

Dodecatheon cusickii var. *album* Suksd. Werdenda 1: 30. 1927. Flowers white; capsule ovoid, 5 mm. long, dehiscing at the apex into 5 valves, glandular-puberulent. The white flowers scarcely merit nomenclatorial recognition for albinism occurs throughout the genus, but the short, broad, glandular-puberulent capsule is distinctive. Unfortunately the original collection is the only material I have seen. Field studies are greatly needed of this plant and of *D. conjugens* var. *viscidum* (Piper) H. L. Mason of the same region. It is possible that the two entities are hybrids between *D. cusickii* and *D. conjugens*. Type locality: damp or dry, mostly rocky places near Spangle, Spokane County, Washington.

6. *Dodecatheon pauciflorum* (Durand) Greene. Few-flowered Shooting Star. Fig. 3768.

Dodecatheon integrifolium var. *vulgare* Hook. Fl. Bor. Amer. 2: 118. 1838.

Dodecatheon Meadia var. *pauciflorum* Durand, Journ. Acad. Phil. II. 3: 95. 1855.

Dodecatheon pauciflorum Greene, Pittonia 2: 72. 1890.

Dodecatheon vulgare Piper, Contr. U.S. Nat. Herb. 11: 445. 1906.

Plants glabrous throughout, with a short erect rootcrown, producing slender but somewhat fleshy roots. Leaves 6–15 cm. long, the blade oblanceolate, entire, obtuse at apex, narrowed at base to a petiole of about equal length or much shorter than the blade; scapes 15–40 cm. high; flowers 1–8, or rarely more in the umbel; pedicels 1–3 cm. long, slender; calyx-lobes narrowly lanceolate, 4–5 mm. long; corolla-lobes 8–15 mm. long, narrowly oblong, lilac-purple, the tube yellow with a wavy band of deep purple; filament-tube 1.5–3.5 mm. long, yellow; anthers purple, 4–7 mm. long; capsule ovoid or narrowly so, 6–12 mm. long, dehiscing from the apex into 5 valves.

Moist meadows, Transition and Canadian Zones; British Columbia to Saskatchewan, south to Oregon, and in the Rocky Mountains to Montana, Utah and Colorado. Type locality: "ad orientem et occidentem fluminis Missouri usque Montes Scopulosos." April-June.

Dodecatheon pauciflorum var. *monanthum* Greene, Pittonia 2: 73. 1890. Slender-stemmed plants 1–3 dm. high; leaves oblanceolate to narrowly so, narrowed at base to a slender petiole usually about as long as the blade; umbels 1-several-flowered; corolla somewhat smaller than in the typical species; filament-tube dark purple. Blue Mountains to the Steen Mountains, Oregon, and to Modoc County, California. Type locality: "eastern Oregon (Cusick's No. 1528)."

7. *Dodecatheon poeticum* Henderson. Poet's Shooting Star. Fig. 3769.

Dodecatheon poeticum Henderson, Rhodora 32: 27. 1930.

Whole plant, including leaves, scapes, pedicels, calyces and capsules, glandular-puberulent, rootcrown erect, producing many elongated fibrous roots. Leaves narrowly to broadly oblanceolate, 5–12 cm. long, the petioles about equaling the blades or sometimes much shorter; scapes 2–3 dm. high, flowers 1–10 in the umbel, 5-merous, on pedicels 1–4 cm. long; calyx-lobes lanceolate, 4–6 mm. long; corolla with a slightly yellowish band at base, bordered above by a broad yellow band blending into the rose-pink of the lobes; filament-tube black-purple or sometimes slightly tinged with yellow; anthers 4–5 mm. long, twice as long as filament-tube, the connectives dark purple; capsule ovoid, 4–7 mm. long, circumscissile but sometimes first dehiscing at the apex into 5 valves.

Open moist places, Arid Transition Zone; Yakima County, Washington, to Hood River and Wallowa Counties, Oregon. Type locality: "near the east line of Hood River County." March-April.

8. *Dodecatheon subalpinum* Eastw. Sierra Shooting Star. Fig. 3770.

Dodecatheon Hendersonii var. *yosemitanum* H. L. Mason, Madroño 1: 187. 1928.

Dodecatheon cusickii var. *yosemitanum* Jepson, Fl. Calif. 3: 70. 1939.

Dodecatheon subalpinum Eastw. Leaflets West. Bot. 2: 37. 1937.

Plant glabrous throughout with a short vertical crown producing fleshy roots and bulblets. Leaves spatulate to oblanceolate, obtuse to rounded at apex, narrowed to a winged membranaceous petiole and together with it 3–7 cm. long, 4–13 mm. wide, entire; scape slender, 4–10 cm. high; umbel with 1–4, or rarely with as many as 8 flowers; bracts lanceolate-acuminate, scarious; flowers 5-merous; calyx-lobes narrowly lanceolate, acuminate; corolla rose-purple or sometimes white, the lobes narrowly lanceolate, 5–8 mm. long, acuminate; filaments united into a rather slender tube about 2 mm. long, dark purple and nearly smooth but obscurely angled or ridged along their united edges; anthers 4 mm. long, narrowly linear-lanceolate, the connective very slender and obscure above the dark purple wedge-shaped base; anther-sacs cream-yellow tinged with purple toward the apex; capsule 6–10 mm. long, nearly cylindrical, circumscissile and then splitting into several valves at apex.

In shady places, Boreal Zones; in the Sierra Nevada from Yosemite National Park to Tulare County, California. Type locality: on Silliman Crest, 10,000 feet, Sequoia National Park, Tulare County, California. May-July.

9. *Dodecatheon Hendersonii* A. Gray. Henderson's Shooting Star. Fig. 3771.

Dodecatheon integrifolium var. *latifolium* Hook. Fl. Bor. Amer. 2: 119. 1838.

Dodecatheon Hendersonii A. Gray, Bot. Gaz. 11: 233. 1886.

Meadia Hendersonii Kuntze, Rev. Gen. Pl. 2: 398. 1891.

Dodecatheon latifolium Piper, Contr. U.S. Nat. Herb. 11: 446. 1906.

Dodecatheon atratum Greene, Rep. Spec. Nov. 13: 323. 1915.

Plant with an erect short rootcrown producing many elongated fleshy-fibrous roots and rice-grain bulblets at flowering time. Leaves glabrous, the blades orbicular-ovate to broadly obovate

or oblong-obovate, 2.5–4 cm. long, rather abruptly tapering to a petiole usually of about equal length, the margins often crisped, entire or glandular-denticulate; scape 2–4 dm. high, glabrous, or the upper part and the pedicels sometimes obscurely glandular-puberulent; umbels 2–12-flowered; flowers 5-merous; the lobes 12–20 mm. long, 4–8 mm. broad, purple with a band of yellow at base edged with white, the tube with a dark black-purple band; filaments united into a tube 2 mm. long, black-purple; anthers 4–5 mm. long, linear, acutish at apex forming a slender pointed "bill," the connectives dark purple; capsule cylindric or ovoid-cylindric, glabrous, circumscissile near the apex then splitting into valves.

Slopes, especially in open woods, Upper Sonoran and Transition Zones; British Columbia to central California on the Pacific Slope, east to eastern Washington, Idaho and eastern Oregon. Type locality: Tualatin Plains, Washington County, Oregon. March–May. Mosquito Bills.

Dodecatheon Hendersonii var. *cruciatum* Greene, Pittonia 2: 75. 1890. (*D. cruciatum* Greene, Pittonia 1: 213. 1888.) Leaves mostly smaller, the blades seldom over 25 mm. wide, usually sparingly and minutely denticulate; pedicels and upper part of scape sparsely glandular-puberulent; flowers 4-merous. This is the most common form of the species in the Coast Ranges of central California, and occurs commonly on wooded slopes in the Upper Sonoran Zone. Type locality: "about San Francisco, extending southward to Monterey, perhaps Santa Barbara, and eastward to Mt. Diablo."

Dodecatheon Hendersonii var. *Hansenii* Greene, Erythea 3: 71. 1895. Plants glabrous throughout; leaves of firm texture, ovate to oval, entire; flowers 5-merous; anthers shorter and less tapering at the apex. This is the common form of the species in the foothills of the Sierra Nevada. Intermediate forms occur in the northern Inner Coast Ranges, California. Type locality: Amador County.

10. *Dodecatheon patulum* Greene. Lowland Shooting Star. Fig. 3772.

Dodecatheon patulum Greene, Pittonia 1: 211. 1888.

Meadia patulum Kuntze, Rev. Gen. Pl. 2: 398. 1891.

Plants with a short rootcrown, the roots fibrous-fleshy. Leaves rosulate, depressed, 2–5 cm. long, spatulate-oblancoate to elliptic, narrowed below to a broad petiole, somewhat fleshy, the margins either obscurely or not at all crisped; scapes usually stout, 8–12 cm. high or rarely higher, glabrous below, sparsely and minutely glandular above; pedicels, calyces and ovaries rather sparsely glandular-puberulent; flowers usually 5-merous, but varying from 4–6-merous; the lobes 15–20 mm. long, mostly pale cream-colored, the base dark velvety purple with an outer circle of yellow; filaments connate into a tube, covered with undulating transverse folds dark purple at base, yellow at base of anthers; anthers blue-purple with blue-purple sacs and connectives, scarcely 2 mm. long, linear-oblong, broad and retuse at apex, becoming recurved, capsule short-oblong or subglobose, circumscissile.

Low moist, usually alkaline soil, or serpentine outcrops, Sonoran Zones; Sacramento and San Joaquin Valleys and the Inner Coast Range valleys of central California. Type locality: lower Sacramento Valley, also alkaline soil along streams at the eastern side of Livermore Valley, California. Jan.–April.

Dodecatheon patulum var. *bernalinum* Greene, Erythea 3: 72. 1895. (*Dodecatheon patulum* var. *gracile* Greene, Erythea 3: 72. 1895.) Scapes, bracts, pedicels and calyx glandular-puberulent; scapes usually a little taller than those of the typical species; corolla-lobes usually rose-pink, rarely white, with dark purple base; stamens as in the species. This variety, in general pubescence and general habit, approaches *Dodecatheon Clevelandii*, but the anthers both in size, shape and color markings, more clearly resemble those of typical *D. patulum*. Moist ground, usually on serpentine outcrops, San Francisco Peninsula from north Santa Clara County to San Francisco. Type locality: Bernal Heights, San Francisco.

11. *Dodecatheon Clevelandii* Greene. Padres' Shooting Star. Fig. 3773.

Dodecatheon Clevelandii Greene, Pittonia 1: 213. 1888.

Meadia Clevelandii Kuntze, Rev. Gen. Pl. 2: 398. 1891.

Roots mostly fibrous with a few fleshy-fibrous; plants minutely glandular-puberulent on the scapes and pedicels. Leaves rosulate, 3–7 cm. long including the winged petiole; the blade narrowly elliptic to elliptic-ovate, narrowed to the winged petiole usually of about equal length, usually crisped on the margin, rarely toothed; scapes 20–40 cm. high; umbels few-to-many-flowered; flowers 5-merous; corolla varying in color from rose to white but commonly with a dark purple center, a band of yellow or white above and light rose toward tips of the lobes; filaments purple, smooth below, wrinkled above; anthers 4–5 mm. long with purple pollen-sacs and a strongly wrinkled cream-colored connective, the filament-tube dark purple.

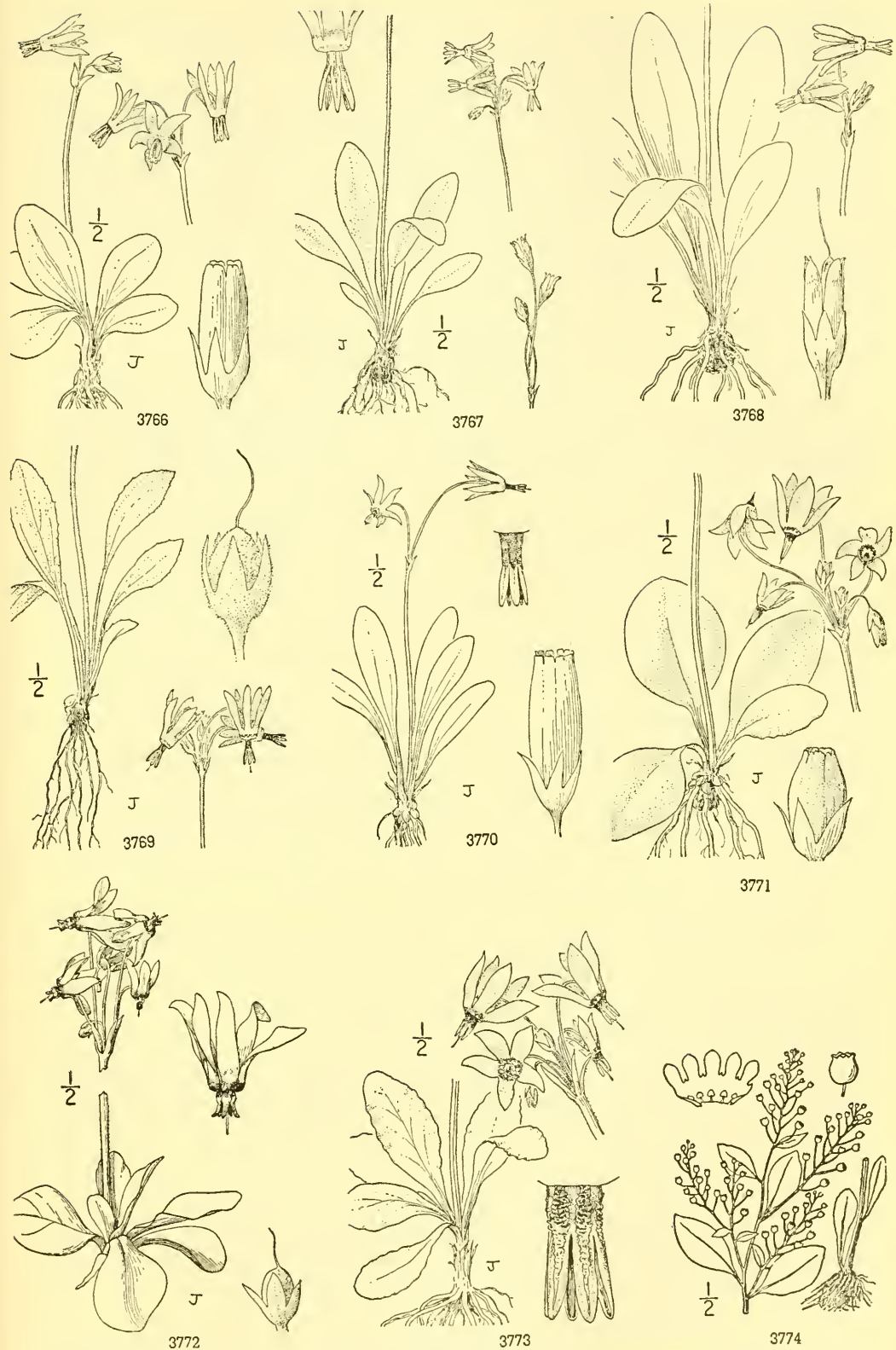
Grassy slopes, Upper Sonoran Zone; cismontane southern California from Santa Barbara south to San Diego County and adjacent Lower California. Type locality: "about San Diego and San Bernardino." Jan.–March.

Dodecatheon Clevelandii subsp. *sanctarum* (Greene) Abrams. (*Dodecatheon sanctarum* Greene, Pittonia 5: 113. 1903.) Like the typical species in habit and floral characters except the colors of the stamens are reversed, the connective being dark purple and the pollen-sacs pale or cream-colored. This variety ranges from Monterey Peninsula south through the Coast Ranges to northern Santa Barbara County, and on Santa Cruz, Anacapa, Santa Catalina, and San Clemente Islands. In the Inner Coast Ranges forms described by Greene as *Dodecatheon laetiflorum* (Pittonia 5: 112. 1903) occur, that suggest intergradation between this variety and *Dodecatheon patulum* Greene. Type locality: Santa Lucia Mountains, Monterey County, California.

12. *SÁMOLUS* [Tourn.] L. Sp. Pl. 171. 1753.

Perennial glabrous herbs, with alternate leaves and small white flowers in terminal racemes or panicles. Calyx-tube adnate to the ovary below, its limb 5-cleft and persistent. Corolla perigynous, 5-lobed or 5-parted, the lobes imbricate. Stamens 5, inserted on the corolla-tube opposite the lobes and alternating with as many staminodia; filaments short; anthers cordate. Ovary partly inferior; ovules numerous, amphitropous. Capsule globose or ovoid, 5-valved at the summit; seeds numerous, minute. [Ancient Celtic name.]

A genus of about 10 species, of wide geographical distribution in all continents. Type species, *Samolus Vallerandii* L.



3766. *Dodecatheon conjugens*
 3767. *Dodecatheon Cusickii*
 3768. *Dodecatheon pauciflorum*

3769. *Dodecatheon poeticum*
 3770. *Dodecatheon subalpinum*
 3771. *Dodecatheon Hendersonii*

3772. *Dodecatheon patulum*
 3773. *Dodecatheon Clevelandii*
 3774. *Samolus floribundus*

1. *Samolus floribundus* H. B. K. Water Pimpernel or Brookweed. Fig. 3774.

Samolus floribundus H. B. K. Nov. Gen. & Sp. 2: 224. 1817.

Samolus americanus Spreng. Syst. 1: 702. 1825.

Samolus Valerandii var. *americanus* A. Gray, Man. ed. 2. 274. 1856.

Stems erect, simple or commonly branched at least at base, 15–45 cm. high. Leaves often rosulate at base as well as scattered along the stem, 2.5–7 cm. long, 1.5–2.5 cm. broad, obovate, obtuse at apex, narrowed below to a short winged petiole, the upper stem-leaves becoming smaller, more abruptly narrowed at base and often sessile; flowers in loose elongated often paniculate racemes; pedicels slender, spreading, 8–20 mm. long; corolla campanulate, about 1.5 mm. broad; staminodia inserted in the sinuses of the corolla-lobes; capsule about 2.5 mm. broad.

Swamps and streams, mainly Sonoran Zones; British Columbia and New Brunswick to Mexico and South America. Rarely collected in the Pacific States except in southern California, where it has been collected in a number of stations from San Luis Obispo County to San Diego County, also on Santa Cruz Island and in northern Lower California; other stations are on the lower Sacramento River and in Monterey County, California. Type locality: Lima, Peru. June–Aug.

Family 117. PLUMBAGINACEAE.

PLUMBAGO FAMILY.

Perennials, mostly acaulescent herbs, with tufted basal leaves, but in *Plumbago* the stems climbing and leafy. Flowers perfect, regular, variously clustered. Calyx tubular or funnellform, 5-toothed, plaited in the sinuses, the tube 5–15-ribbed. Corolla 5-merous, the segments distinct, connate at base or united into a tube, convolute or imbricate in the bud. Stamens 5, hypogynous, opposite the corolla-segments; filaments distinct or united at base; anthers versatile, 2-celled. Ovary superior, 1-celled; ovule 1, pendulous, anatropous; styles 5, distinct or united. Fruit a utricle or an achene, enclosed by the calyx, rarely a dehiscent capsule. Seed solitary, with a membranous testa; endosperm mealy or none; embryo straight.

About 10 genera and 350 species, of wide geographical distribution.

Flowers cymose-paniculate on the branches of the scape; leaves broad and flat.

1. *Limonium*.

Flowers in a dense scarious-bracted head at the summit of the simple scape; leaves narrowly linear.

2. *Armeria*.

1. *LIMONIUM* Mill. Gard. Dict. abr. ed. 4. 1754.

Herbs, with broad flat leaves in a basal tuft, and branching bracted scapes. Flowers small, cymose-paniculate on the branches of the scapes, in few-flowered bracteolate clusters, forming secund spikes. Calyx campanulate or tubular, usually 10-ribbed, the limb scarious, 5-toothed. Petals 5, distinct, clawed. Stamens 5, adnate to the petals at base. Styles 5, distinct in our species, stigmatic on the inner side. Fruit a utricle. [Ancient Greek name for the wild beet.]

A genus of about 120 species, of wide geographical distribution. Besides the following, two species occur on the Atlantic Coast of North America. Type species, *Limonium vulgare* Mill.

1. *Limonium californicum* (Boiss.) Heller. California Marsh-rosemary.
Fig. 3775.

Statice californica Boiss. in A. DC. Prod. 12: 643. 1848.

Statice Limonium var. *californica* A. Gray, Bot. Calif. 1: 466. 1846.

Limonium commune var. *californica* Greene, Man. Bay Reg. 235. 1894.

Limonium californicum Heller, Cat. N. Amer. Pl. 6. 1898.

Leaves obovate to oblong-obovate, obtuse, rounded or retuse at apex, inconspicuously mucronulate, 5–16 cm. long, 1.5–6 cm. broad, rather thick and coriaceous, narrowed to stout often reddish petioles 2–10 cm. long; scape stout, solid, 20–40 cm. high; paniculately much-branched above to usually below the middle, the panicle 4–35 cm. wide, the branches ascending densely flowered at the apices, forming small secund spikes 10–35 mm. long; calyx obconic, 4.5–5.5 mm. long, the ribs pubescent from the base to above the middle; the lobes deltoid-ovate, acute or acutish, 0.5–0.7 mm. long, intermediate teeth obsolescent or none.

Coast marshes, Humid Transition and Sonoran Zones; Humboldt County to Orange County and San Clemente Island, California. Type locality: San Francisco and Santa Clara, California. July–Nov.

Limonium mexicanum Blake, Rhodora 18: 59. 1916. (*Limonium commune* var. *mexicanum* Jepson, Fl. Calif. 3: 77. 1939.) Like *L. californicum* in general habit and structure, but the calyx glabrous, or, according to the original description, "rarely with a few hairs." This may be a distinct specific entity, but it is so much like the preceding species that experimental studies are needed to determine its relationship. San Diego County, California, and northern Lower California. Type locality: San Diego.

2. *ARMERIA* Willd. Enum. Hort. Ber. 333. 1809.

Acaulescent tufted herbs, with mostly naked scapes and persistent narrow basal leaves. Flowers in terminal heads, sessile or short-pedicelled, subtended by scarious

bracts and bractlets, the former involucrate with the two outermost reflexed and sheath-like. Calyx funnelform, 5-toothed and 10-ribbed, scarious, oblique at base. Petals, 5, distinct or more or less united. Stamens 5, adnate to the base of the petals. Styles united at base, longitudinally stigmatic above, pubescent below. Fruit a utricle, rarely dehiscent, 5-pointed at the apex. [The old Latin name.]

About 50 species, inhabiting north temperate regions and southern South America. Type species, *Statice Armeria* L. This is also the standard species of *Statice* L., but the generic name *Armeria* has been conserved.

1. *Armeria ártica* subsp. *califórnica* (Boiss.) Abrams. California Thrift.

Fig. 3776.

Armeria andina var. *califórnica* Boiss. in A. DC. Prod. 12: 682. 1848.

Statice arctica var. *califórnica* Blake, *Rhodora* 19: 9. 1917.

Plants tufted, from a long tapering taproot. Leaves in a dense basal tuft, narrowly linear, 4–15 cm. long, 2–3.5 mm. wide, rounded at apex, glabrous throughout; scapes 1 to several, 5–40 cm. high; heads compact, 15–25 mm. thick; reflexed sheathing bracts 1–2 cm. long, outer involucrate bracts 3, ovate to ovate-lanceolate, scarious-margined, 8–15 mm. long, the inner ones about 7, broadly elliptic, rounded at apex, spikelets 3-flowered, the subtending bract cuneate-elliptic; bractlets broadly oval; calyx 6.5–7 mm. long, pubescent on the ribs, otherwise glabrous; calyx-lobes about 1 mm. long, broadly triangular; petals lilac-pink.

Bluffs and exposed grasslands along the seashore, Humid Transition Zone; coast of Oregon to San Luis Obispo County and Santa Rosa Island, California. Type locality: California. Collected by Coulter. April–Aug. Sea-pink.

Armeria ártica (Cham.) Wallr. Beitr. Bot. 193. 1844. The typical species differs in having narrower, acute or acutish leaves that are ciliolate at least below. Alaska to Vancouver Island. Plants on the Olympic Peninsula, Washington, are more or less intermediate between the typical species and subsp. *califórnica*.

Family 118. STYRACACEAE.

STORAX FAMILY.

Trees or shrubs, with alternate exstipulate, entire or serrate leaves, and mostly stellate pubescence. Flowers regular, perfect or rarely polygamodioecious, clustered and appearing with or sometimes before the leaves. Calyx 4–8-toothed or entire, the tube more or less adnate to the ovary. Corolla 4–8-lobed or the petals sometimes distinct. Stamens twice as many as the corolla-segments or sometimes more, in 1 series, attached to the tube or the base of the corolla, the filaments often connate at base. Ovary partly inferior, 2–5-celled; ovules 1 to few in each cell, anatropous; style slender; stigmas entire or 2–5-lobed. Fruit a berry or drupe, often nearly dry, indehiscent, 1-seeded, or 2–5-celled with 1 seed in each cell. Endosperm copious; embryo straight or slightly curved; cotyledons flat.

A family of about 7 genera and 120 species, mostly tropical.

1. *STYRAX* L. Sp. Pl. 444. 1753.

Shrubs or small trees, stellate-pubescent and often lepidote, with mostly deciduous leaves and rather showy white drooping flowers in terminal or axillary few-flowered clusters, appearing before or with the leaves. Calyx persistent, adnate at base to the ovary, its limb obscurely 5-toothed. Petals 5 and distinct or united at base. Stamens usually 10, the filaments united below or rarely separate, attached to the base of the corolla; anthers linear. Ovary nearly free from the calyx, usually 3-celled at base; ovules several in each cell; stigma 3-lobed or entire. Fruit nearly dry, globose or ellipsoid, coriaceous, usually only 1-seeded, 3-valved at apex. [The ancient Greek name of Storax.]

A genus of about 70 species, native of Asia, southern Europe and North and South America. Besides the following, four other species occur in the eastern and southern United States. Type species, *Styrax officinalis* L.

1. *Styrax califórnica* Torr. California Storax. Fig. 3777.

Styrax califórnica Torr. Smiths. Contr. 61: 4. 1853.

Styrax officinalis var. *califórnica* Rehder. Mitt. Deutsch. Dendr. Gesellsch. 24: 226. 1915.

Arborescent shrub, 1.5–3 m. high, with smooth gray-brown branchlets. Leaves deciduous, suborbicular to broadly ovate, obtuse to shallowly cordate at base, obtuse or rounded at apex, 2–6 cm. long, entire, glabrous above, paler and somewhat cinereous beneath with a stellate pubescence especially on the veins; petioles slender, 3–10 mm. long, stellate-pubescent and sometimes glandular; flowers white, in clusters of 2–4 terminating the branchlets; calyx and clavate pedicel goblet-shaped, the limb truncate and very obscurely and remotely toothed; petals 5–10, oblong-oblancheolate, 10–15 mm. long; filaments pubescent below; fruit nut-like, the ovoid-globose seed 12–14 mm. broad, light brown, smooth.

Hillsides and canyons, mainly Upper Sonoran Zone; foothills of the Sierra Nevada and Inner Coast Range, from Shasta County to Lake and Tulare Counties, California. Type locality: upper Sacramento River, col-

lected by Fremont. This California species is very similar to, and by some botanists considered the same as, the Old World species *Styrax officinalis* L. April-May.

Styrax californica var. *fulvescens* Eastw. Bot. Gaz. 41: 286. 1906. (*Styrax officinalis* var. *fulvescens* Munz & Jtn. Bull. Torrey Club 51: 297. 1924.) Pubescence usually abundant and more or less fulvous in the extreme forms on the leaves, twigs and calyces; on the intermediate forms mainly on the buds and on the veins of the younger leaves. Canyons and mountain slopes, Upper Sonoran Zone; Santa Barbara County to San Diego County, California. Locally distributed in the following mountain ranges: Santa Ynez, San Bernardino, Santa Ana, Palomar; also in the vicinity of Mesa Grande. San Diego County, the known southern limit. Type locality: Santa Ynez Mountains back of Santa Barbara.

Family 119. OLEACEAE.

OLIVE FAMILY.

Trees, erect or scandent shrubs, or rarely herbs, glabrous or rarely pubescent. Leaves opposite or rarely alternate or verticillate, simple or pinnate, entirely or dentate, deciduous or persistent, without stipules. Flowers in terminal or axillary panicles, cymes or fascicles, regular, perfect, polygamous or dioecious. Calyx free from the ovary, rarely wanting, small, 4-lobed or rarely many-lobed. Corolla sometimes wanting, when present, sympetalous or choripetalous, 2-4-merous. Stamens 2 or rarely 4, hypogynous or inserted on the corolla-tube; filaments short. Ovary superior, 2-celled; ovules few in each cell; styles usually short or none. Fruit a capsule, samara, berry or drupe. Seeds erect or pendulous; endosperm present or absent; embryo straight.

A family of about 25 genera and 300 species, of wide geographical distribution in tropical and temperate regions.

Fruit a samara; leaves pinnate, but the leaflets often reduced to 1 in *F. anomala*; trees.

1. *Fraxinus*.

Fruit not a samara; leaves simple and entire.

Corolla none; fruit a drupe; leaves all opposite; arborescent shrub.

2. *Forestiera*.

Corolla present, yellow; fruit a 2-parted capsule; upper leaves alternate; low shrub or suffrutescent herbs.

3. *Menodora*.

1. FRÁXINUS L. Sp. Pl. 1057. 1753.

Trees or arborescent shrubs, with deciduous, opposite, odd-pinnate leaves, the leaflets often reduced to 1 in *F. anomala*. Flowers appearing with or before the leaves from the axils of the leaf-scars on last season twigs, fasciculate or racemose-fasciculate, small, dioecious or polygamous. Calyx 4-lobed or irregularly lobed, entire or sometimes wanting. Petals commonly wanting, rarely 2 or 4, separate or united in pairs at base. Stamens 2, rarely 3 or 4, hypogynous, or inserted on the base of the petals. Ovules 2 in each ovary-cell, pendulous; stigma 2-lobed. Fruit a samara, winged all around or only at the apex; seed usually 1, oblong. [The ancient Latin name of the ash.]

A genus of about 40 species, inhabiting the temperate regions of North America, Europe and Asia. Type species, *Fraxinus excelsior* L.

Petals none; flowers dioecious.

Leaflets 5 or 7; body of the samara subterete, the wing terminal or extending down the side of the body as a narrow margin.

Wing of the samara extending down the side of the body for about one-fourth to one-half its length; lateral leaflets sessile or subsessile.

1. *F. latifolia*.

Wing of the samara terminal, extending down the side of the body less than one-fourth its length as a very narrow margin; lateral leaflets petiolulate.

2. *F. velutina*.

Leaflets only 1 or rarely 3; body of the samara strongly flattened and broadly wing-margined to the base.

3. *F. anomala*.

Petals 2; flowers perfect; body of the samara strongly flattened, broadly wing-margined to the base.

4. *F. dipetala*.

1. *Fraxinus latifolia* Benth. Oregon Ash. Fig. 3778.

Fraxinus latifolia Benth. Bot. Sulph. 33. 1844.

Fraxinus oregona Nutt. N. Amer. Sylva 3: 59. pl. 99. 1849.

Fraxinus americana var. *oregona* Wesmael. Bull. Soc. Belg. 31: 110. 1892.

Fraxinus oregona var. *latifolia* Lingelsh. Engl. Bot. Jahrb. 40: 220. 1907.

Tree 10-25 m. high with a trunk often 1-1.25 m. in diameter, young branches usually grayish-tomentose, stout. Leaves 4-7-foliolate, 18-30 cm. long; leaflets tomentose beneath, sometimes very thinly so, glabrous or thinly pubescent above, entire, wavy or irregularly crenate-serrate, the terminal one 6-10 cm. long, petiolulate, lanceolate to oblanceolate and acute or acuminate, varying to ovate or obovate and rounded at apex, rounded at base, lateral ones smaller and usually obtuse at base, sessile or subsessile; samaras in loose panicles, the wing usually extending down the side of the body as a narrow margin to near the middle, 2.5-4.5 cm. long, 7-9 mm. wide, rounded at apex.

Streams and moist flats, mainly Humid and Arid Transition Zones; Kitsop and King Counties, western Washington, south on the Pacific Slope to Santa Clara and Tulare Counties, California. The Sierra Nevada

plants have a longer narrower seed-body margined only to the middle or even less and more narrowly so. Type locality: San Francisco. March-April.

2. *Fraxinus velutina* Torr. Arizona Ash. Fig. 3779.

Fraxinus velutina Torr. in Emory, Notes Mil. Rec. 149. 1848.

Trees, 5-15 m. high, with light grayish bark, the twigs of the season villous-tomentose to puberulent. Leaflets commonly 5, occasionally 3 or 7, pubescent to villous-tomentose on the under surface, variable but most commonly lanceolate and acute or acuminate, 4-6, rarely 8 cm. long, 1.5-3.5, rarely 5 cm. wide, subsessile or short-petiolulate, entire or irregularly serrate; samaras 2.5-3.5 cm. long, the wing 4-6 mm. wide, longer than the body of the seed, and narrowly decurrent down the sides of the body only a short distance.

Canyons and stream banks, Upper Sonoran Zone; Mojave Desert and San Gabriel Mountains, southern California, east to Arizona, New Mexico, and south to northern Lower California and Sonora. Type locality: "In the region between the waters of the Del Norte and Gila; also on the Mimbres, a tributary of the latter river." March-May.

Fraxinus velutina var. *coriacea* (S. Wats.) Rehder, Proc. Amer. Acad. 53: 206. 1917. (*F. coriacea* S. Wats. Amer. Nat. 7: 30. 1873.) Leaves and young twigs usually glabrous, the lateral leaflets well-stalked. Inyo County, California, to southern Nevada and Utah; also the Sierra Liebre and cismontane slopes of the San Bernardino Mountains, California. These California plants are not quite typical and have been described as *Fraxinus oregona* var. *glabra* Lingelsh. (Pflanzenreich 4²¹³: 43. 1920.) Type locality: "Ash Meadows, Nevada, and Devil's Run Canyon, Arizona."

3. *Fraxinus anomala* Torr. Dwarf Ash. Fig. 3780.

Fraxinus anomala Torr. ex S. Wats. Bot. King Expl. 283. 1871.

Fraxinus anomala var. *triphylla* M. E. Jones, Proc. Calif. Acad. II. 5: 707. 1895.

Small tree or shrub up to 5-6 m. high, young twigs light brown, glabrous or thinly pubescent, older branches gray, bud-scales rusty stellate-pubescent. Leaves simple or rarely trifoliolate, the blades suborbicular to ovate, 2-6 cm. long, entire or serrate, obtuse to subcordate at base, rounded to acute at apex, glabrous, petioles rather slender, about equaling the blades, thinly pubescent toward the base; flowers polygamous, perfect and pistillate, appearing with the leaves; calyx 1.5 mm. long, minutely 4-toothed; samara 18-26 mm. long, 6-8 mm. wide, the body about as long as the wing, flat, the wing decurrent down the sides of the seed-body almost to the base.

Dry gulches and canyons, mainly Upper Sonoran Zone; desert ranges, California, east through southern Nevada and Utah to southern Colorado, south to Arizona and New Mexico. Locally distributed in California in the Panamint, Providence, and Clark Mountains. Type locality: Labyrinth Canyon, Colorado River, Utah. March-May.

4. *Fraxinus dipetala* Hook. & Arn. California Flowering or Foothill Ash. Fig. 3781.

Fraxinus dipetala Hook. & Arn. Bot. Beechey 362. 1841.

Ornus dipetala Nutt. Sylva 3: 66. pl. 101. 1849.

Chionanthus fraxinifolius Kell. Proc. Calif. Acad. 5: 18. 1873.

Fraxinus dipetala var. *brachyptera* A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 74. 1886.

Petromelia dipetala Nieuwl. Amer. Midl. Nat. 3: 188. 1914.

Small tree or shrub, 2-7 m. high, glabrous throughout or the nascent parts sparsely puberulent, the branchlets more or less 4-angled, the angles on vigorous shoots often winged. Leaves odd-pinnate; leaflets 3-9, mostly 5 or 7, elliptic-ovate to obovate, 2-3 cm. long, entire or commonly crenate-serrate, glossy green and firm in texture, rounded to acutish at apex, abruptly narrowed to a short petiolule, the rachis and petiole slender; flowers in many-flowered panicles appearing on last season's twigs well below the leaves or also at the apex of the twig among the leaves of the season, perfect or polygamous; petals 2, white, 4-5 mm. long, 1.5 mm. broad; samara 2-3 mm. long, 7-10 mm. wide, often retuse at apex, the body flattened, winged on the sides to the base.

Hillides and canyons, Upper Sonoran Zone; Shasta County southward in the Coast Ranges and Sierra Nevada to Orange County, California. Type locality: California. Collected by Douglas. April-May. Fringe-flowered Ash.

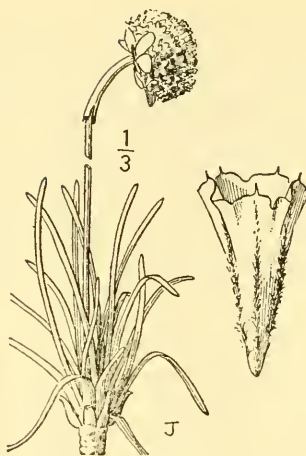
2. FORESTIÉRA Poir. Encycl. Suppl. 1: 132. 1810; 2: 664. 1811.

Deciduous shrubs, with opposite simple or entire or serrulate leaves. Flowers small, fasciculate or in short racemes, dioecious or polygamous. Calyx minute, unequally 5-6-cleft, sometimes none. Corolla wanting, or rarely with 2 or 3 petals. Stamens 2-4. Ovary 2-celled; style slender; ovules 2 in each cell, pendulous. Fruit drupe-like, ovoid, or subglobose, with 1 or rarely 2 seeds, glabrous or pubescent. [Name in honor of Charles Le Forestier, a French physician.]

A genus of about 14 species, inhabiting North and Central America, West Indies, and Brazil. Type species, *Adelia acuminata* Michx.



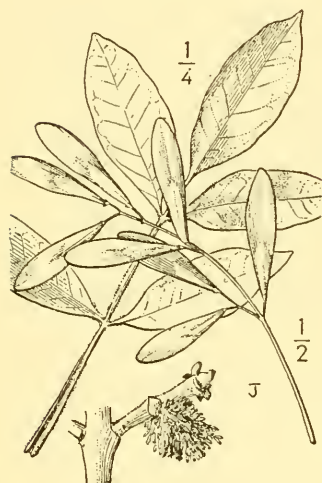
3775



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3782



3783

3775. *Limonium californicum*
 3776. *Armeria arctica*
 3777. *Styrax californica*

3778. *Fraxinus latifolia*
 3779. *Fraxinus velutina*
 3780. *Fraxinus anomala*

3781. *Fraxinus dipetala*
 3782. *Forestiera neo-mexicana*
 3783. *Menodora scoparia*

1. *Forestiera neo-mexicana* A. Gray. Desert Olive. Fig. 3782.

Forestiera acuminata var. *parvifolia* A. Gray, Proc. Amer. Acad. 4: 364. 1860.

Forestiera neo-mexicana A. Gray, Proc. Amer. Acad. 12: 63. 1876.

Adelia neo-mexicana Kuntze, Rev. Gen. Pl. 2: 410. 1891.

Adelia parvifolia Coville, Contr. U.S. Nat. Herb. 4: 148. 1893.

Glabrous shrub or small tree, 1-5 m. high, with smooth light gray bark and smooth often yellowish branches. Leaves oblanceolate, 2-6 cm. long, 5-16 mm. wide, rounded to acute at apex, narrowed to a slender petiole at base, entire to serrulate, rather thick; flowers dioecious or the pistillate plant sometimes with a few perfect flowers appearing with or before the leaves, each fascicled, subtended by a number of small brownish bud-scales and 4 larger greenish yellow ciliate bracts; staminate flowers sessile; pistillate on a slender pedicel 5-7 mm. long, with a rudimentary calyx at base of the ovary; fruit a bluish black ellipsoid drupe, 7-8 mm. long.

Flats and stream banks, Sonoran Zones; Inner Coast Ranges, Mount Hamilton Range, Alameda County, south to the San Jacinto Mountains, Riverside County, and eastward in the Mojave Desert to Inyo County and eastern San Bernardino County, California, extending to Arizona, southern Utah, southern Colorado, New Mexico, and western Texas. Type locality: near Santa Fe, New Mexico. March-April.

3. *MENODORA* Humb. & Bonpl. Pl. Equin. 2: 98. pl. 110. 1809.

Low shrubs or suffrutescent herbs, glabrous or rarely pubescent. Leaves simple, entire or toothed, the upper alternate, the lower often opposite. Flowers perfect, solitary and terminal or dichotomously paniced or corymbose. Calyx deeply 5-15-lobed, divided into linear lobes. Corolla from funnelform to subrotate, 5-6-lobed. Stamens 2, the filaments short, attached to the corolla-tube. Ovary 2-celled, emarginate; style slender; ovules 2 or 4 in each cell, attached at the base. Fruit a capsule, 2-parted or 2-cleft, the wall membranous and circumscissile or irregularly dehiscent. Seeds usually 2 or 4 in each cell; endosperm none. [Name from two Greek words, meaning force and gift.]

A genus of about 15 species, native of North America, South America, and southern Africa. Type species, *Menodora helianthemoides* Humb. & Bonpl.

Plants not spinescent; corolla yellow, subrotate, the lobes longer than the tube; ovules and seeds 4 in each cell.

Upper leaves much-reduced and bract-like, plant glabrous or nearly so.

1. *M. scoparia*.

Upper leaves but little reduced; plant usually scabrous.

2. *M. scabra*.

Plants intricately branched, the branchlets stout, divaricate and spine-tipped; corolla white, funnelform, the lobes shorter than the tube; ovules and seeds 2 in each cell.

3. *M. spinescens*.

1. *Menodora scoparia* Engelm. Smooth Menodora. Fig. 3783.

Menodora scoparia Engelm. ex A. Gray, Bot. Calif. 1: 471. 1876.

Menodora scabra var. *glabrescens* A. Gray in S. Wats. Cat. Pl. Wheeler Exp. 15. 1874.

Plant suffrutescent and branched at base, 25-75 cm. high, the branches erect, cymosely few-branched at apex, slender, glabrous or nearly so. Lower leaves opposite, oblong-obovate to oblanceolate, 10-25 mm. long, gradually narrowed to a sessile or subsessile base, pale green and glabrous or sparsely puberulent, upper leaves remote and reduced; flowers solitary in the upper leaf-axils on pedicels 15-25 mm. long; calyx-lobes 5-7, subulate, 3-5 mm. long; corolla subrotate, yellow, the lobes ovate, about 7 mm. long; capsule-lobes approximate; seeds 4, each acutely angled on the ventral side, and rounded on the back, pitted.

Desert slopes, Sonoran Zones; New York, Clark, and Providence Mountains in the eastern Mojave Desert, and desert slopes of the Laguna Mountains, California, to Arizona, Coahuila, Sonora, and Lower California. Type locality: mountains about Saltillo, Coahuila. May-Oct.

2. *Menodora scabra* A. Gray. Rough Menodora. Fig. 3784.

Menodora scabra Engelm. ex A. Gray, Amer. Journ. Sci. II. 14: 44. 1852.

Menodora laevis Woot. & Standl. Contr. U.S. Nat. Herb. 16: 158. 1913.

Menodora scabra var. *laevis* Steyererm. Ann. Mo. Bot. Gard. 19: 137. 1932.

Perennial with a suffrutescent base from a stout woody root, the stems few to many, 8-35 cm. high, finely scabrous, sometimes sparsely so, corymbosely branched at apex. Leaves opposite, narrowly oblanceolate to oblong-oblanceolate, 6-25 mm. long, the upper alternate, only slightly reduced; calyx-lobes 7-11, linear-filiform, delicate; corolla subrotate, yellow, the lobes ovate, 7-8 mm. long; capsule-lobes approximate, the membranous wall irregularly and tardily breaking up; seeds 4 in each lobe, each forming a quarter-round, rounded on the back, acutely angled on the ventral side and keeled, conspicuously pitted, tan-colored, 4-5 mm. long.

Dry desert ridges and barancas, Sonoran Zones; Mojave Desert, California, Arizona, southern Utah, southern Colorado, New Mexico, and western Texas south to Durango and Lower California. The only known California station is in the New York Mountains. Type locality: Ojo del Muerto, south of Santa Fe, New Mexico. May-Oct.

3. *Menodora spinescens* A. Gray. Spiny Menodora. Fig. 3785.

Menodora spinescens A. Gray, Proc. Amer. Acad. 7: 388. 1868.

Menodora spinescens var. *mohavensis* Steyererm. Ann. Mo. Bot. Gard. 19: 155. 1932.

Low intricately branched shrub with mostly ascending branches and divaricate spinescent branchlets, 2-5 or rarely 10 dm. high, light olive-green and minutely puberulent. Leaves linear-

oblanceolate or often reduced to scales on the main branches, 3-12 mm. long, usually puberulent; flowers solitary in the leaf-axils, but sometimes approximate on short branchlets, subsessile or on short peduncles; calyx-lobes 5-7, linear-subulate, about 4 mm. long; corolla funnelform, 4-7 mm. long, white tinged with purple on the outer surface, the lobes spreading, oblong-ovate; capsule-lobes 6-7 mm. in diameter, diverging, almost separate, the thin membranous wall shining; seeds 2 in each cell, semiglobose, pitted.

Rocky washes and dry slopes, Lower Sonoran Zone; desert ranges of Inyo and San Bernardino Counties to southern Nevada. The proposed variety is a larger-flowered form found "14 miles northeast of Barstow" by Parish. Type locality: "Cañons and hillsides, southeastern part of the State of Nevada." April-May.

Family 120. LOGANIACEAE.

LOGANIA FAMILY.

Herbs, shrubs, woody vines or trees, with simple opposite or rarely verticillate stipulate leaves, watery juice, and cymose inflorescence. Flowers regular, usually perfect, 4-5-merous. Calyx-lobes imbricate. Corolla sympetalous, the lobes valvate, imbricate or contorted. Stamens as many as the corolla-lobes, alternate with them and attached to the tube or the throat. Disk none or small. Ovary superior, 2-celled; style usually simple; stigma capitate or 2-lobed; ovules usually many, amphitropous or anatropous. Fruit a capsule, berry or drupe; seeds with endosperm.

A family of 33 genera and about 600 species, mostly tropical.

1. BUDDLEJA [Houst.] L. Sp. Pl. 112. 1753.

Shrubs, or some trees or herbs, usually pubescent. Leaves simple, entire or dentate, petioled. Stipules connecting the bases of the petioles sometimes reduced to a mere line. Flowers 4-merous, or rarely 5-merous. Calyx campanulate. Corolla rotate-campanulate or salverform, the lobes ovate or orbicular, imbricate in the bud. Anthers sessile or nearly so on the throat or tube of the corolla. Fruit a septicidal, globose or oblong capsule; valves 2-cleft at the apex and separating from the placentae. Seeds numerous; embryo straight. [Name in honor of Adam Buddle, an English botanist and contemporary of John Ray.]

A genus of about 70 species, inhabiting tropical and warm temperate regions of North and South America, Asia, and South Africa. Type species, *Buddleja americana* L.

1. *Buddleja utahensis* Coville. Utah Buddleia. Fig. 3786.

Buddleja utahensis Coville, Proc. Biol. Soc. Wash. 7: 69. 1892.

Low, much-branched shrub, 20-30 cm. high, herbage including calyx densely tomentose, older bark gray and shredded. Leaves linear to linear-oblong, with revolute margins, 1.5-3 cm. long, widely spreading or reflexed, undulate-dentate petioles 2 mm. long or less; the axils usually with a fascicle of very small leaves; inflorescence of globose clusters of cymes, forming 2-4 heads, about 10-15 mm. thick and about as far apart, at the ends of the branches; corolla purple, 4-5 mm. long, broadly salverform, the lobes suborbicular, about 1 mm. long, the tube tomentulose without.

Dry desert slopes, especially in volcanic rock, Lower Sonoran Zone; Panamint and Kingston Mountains, Mojave Desert, California, and in the neighboring Charleston Mountains and Armagosa Desert, southwestern Nevada, east to southern Utah. Type locality: near St. George, Utah. May-Oct.

Family 121. GENTIANACEAE.

GENTIAN FAMILY.

Herbs with bitter colorless juice, and opposite or rarely verticillate exstipulate leaves. Flowers regular and perfect, axillary or terminal at the ends of the stems or branches, often forming a cymose inflorescence. Calyx persistent, free from the ovary, 4-12-lobed, -parted or -toothed. Corolla sympetalous, funnelform to rotate, often marcescent, 4-12-lobed or -parted, the divisions convolute or rarely imbricate in the bud. Stamens as many as the lobes of the corolla and alternate with them, inserted on the tube or throat; anthers 2-celled and dehiscent longitudinally. Ovary 1-celled, or (in some exotic genera) 2-celled; ovules numerous, anatropous or amphitropous; style 1, simple, or rarely cleft a short distance below the stigmatic surface, rarely none; stigma entire or 2-lobed. Fruit a capsule, usually dehiscent from the apex by 2 valves. Seeds usually numerous, minute, globose, angled or compressed; endosperm fleshy; embryo minute, terete, or conic.

A family of about 65 genera and 600 species of wide distribution in all continents, but most abundant in the temperate regions.

Style slender almost filiform, usually dehiscent from the fruiting capsule.

Calyx 4-toothed and 4-angled; corolla short-salverform, 4-lobed; anthers cordate-ovate, not coiled or recurved after dehiscence. 1. *Microcala*.

Calyx 5- (rarely 4-) parted almost to the base; anthers oblong or linear.

Corolla salverform, pink or rarely white; anther spirally twisted after anthesis.

Corolla campanulate-funnelform, bluish or white; anthers not spirally coiled after anthesis. 2. *Centaurium*.

3. *Eustoma*.

Style short, subulate and persistent, or none.

Corolla campanulate to funnelform, without glands on the inner surface of the lobes.

4. *Gentiana*.

Corolla rotate, the tube very short, the lobes bearing a large single or double gland on the inner surface.

5. *Sweetia*.

1. MICROCALA Hoffm. & Link, Fl. Port. 1: 359. 1806.

Small annual herbs, with simple or branched, filiform stems, the branches or peduncles bearing a solitary terminal flower. Leaves opposite, entire, sessile. Calyx 4-angled and 4-toothed. Corolla salverform, 4-lobed, the lobes convolute in the bud. Stamens 4, attached to the throat of the corolla; anthers cordate-ovate. Style filiform, deciduous; stigma 2-lobed, the lobes flabelliform, at first connivent. Capsule ovoid, usually covered by the withering-persistent corolla. Seeds minute, numerous, minutely reticulately pitted. [Name from two Greek words meaning small and beautiful.]

A genus of 2 species, the second one, *M. filiformis* (L.) Hoffm. & Link which is the type species, inhabits the Mediterranean region and central Europe.

1. *Microcala quadrangulàris* (Lam.) Griseb. American *Microcala*. Fig. 3787.

Gentiana quadrangularis Lam. Encyl. 2: 645. 1790.

Exacum quadrangularis Willd. Sp. Pl. 1: 636. 1797.

Microcala quadrangularis Griseb. in A. D.C. Prod. 9: 63. 1845.

Glabrous annual, the stems simple or few-branched, erect, 2-8 cm. high. Basal leaves usually 4 or 6, approximate on account of the very short internodes, those above the base in 2 or 3 rather distant pairs, oblong-linear to oval, 4-8 mm. long; calyx 3-6 mm. long, 4-angled with 4 alternating ribs, the teeth very short, subulate; corolla yellow, short salverform, about 6 mm. long, the lobes about 2 mm. long; capsule ovoid about equaling the calyx.

Grassy places, mainly Upper Sonoran Zone; Willamette Valley, Oregon, to the Sacramento Valley and Sierra Nevada foothills and the California Coast Ranges to northern Santa Barbara County; also western South America. Type locality: environs of Lima, Peru. April-June.

2. CENTAURIUM Hill, Brit. Herb. 62. 1756.

Annual or rarely biennial glabrous herbs, with opposite, sessile or amplexicaul leaves. Flowers spicate or cymose, 4-5-merous, white, pink or yellow. Calyx narrow, cylindric, 4-5-lobed or -divided, the lobes linear or linear-lanceolate, frequently keeled and scarious-margined. Corolla salverform, 4-5-lobed, the lobes contorted, convolute in the bud, usually much shorter than the tube. Stamens 4 or 5, inserted on the corolla-tube and alternating with the lobes. Ovary 1-celled, the parietal placentae sometimes intruded; style very slender, deciduous; stigma 2-lobed. Capsule oblong-ovoid to fusiform, 2-valved. Seeds oblong to spherical, minute, reticulated. [From the ancient name (Latin *centaurium*, Greek *kentaurion*) of two plants *Chlora perfoliata* and *Centaurium umbellatum*, the medicinal properties of which were supposed to have been discovered by the centaur Chiron.]

A genus of about 30 species, chiefly in the northern hemisphere. Type species, *Gentiana Centaurium* L.

Flowers in rather crowded umbellate cymes terminating the branches, sessile or subsessile, the pedicels when present not over 1 mm. long, each flower subtended by a bract bearing a rudimentary floret in its axil.

Basal leaves tufted.

1. *C. umbellatum*.

Basal leaves not tufted.

2. *C. floribundum*.

Flowers pedicellate or if sessile without subtending rudimentary florets.

Anthers oblong, 1.5-2.5 mm. long; corolla-lobes less than half the length of the tube.

Pedicels short, the longest not over 12 mm. long.

Pedicels not over 0.5 mm. long, the ultimate cymes 2-3-flowered; anthers not spirally coiled after anthesis, not sagittate, one cell longer than the other; stigma-lobes narrower than long.

3. *C. Muhlenbergii*.

Pedicels 1-12 mm. long; ultimate cymes loosely flowered; anthers spirally coiled after anthesis, sagittate at base and the cells of equal length; stigma-lobes broader than long.

Corolla-lobes narrowly oblong-lanceolate, 3.5 mm. long, scarcely 1.5 mm. broad.

4. *C. curvistaminium*.

Corolla-lobes ovate, 5-5.5 mm. long, 2.5-3 mm. broad.

5. *C. Davyi*.

Pedicels, at least some of them, over 20 mm. long; corolla-lobes 3-4 mm. long, oblong.

6. *C. exaltatum*.

Anthers linear, 3.5 mm. long; corolla-lobes over half the length of the tube.

Stigma-lobes always appressed against each other, 0.5 mm. high, very narrow, the style not divided below them.

7. *C. trichanthum*.

Stigma-lobes divaricately spreading, 1-1.5 mm. high and nearly as broad, the style cleft for a short distance beneath them.

8. *C. venustum*.

1. *Centaurium umbellatum* Gilib. Common or European Centaury. Fig. 3788.

Gentiana Centaurium L. Sp. Pl. 229. 1753.

Centaurium umbellatum Gilib. Fl. Lithuan. 35. 1781.

Centaurium Erythraea Rafn, Dan. Holst. Fl. 2: 75. 1796–1800.

Erythraea Centaurium Pers. Syn. Pl. 1: 283. 1805.

Centaurium Centaurium W. F. Wight, Contr. U.S. Nat. Herb. 11: 449. 1906.

Erect annual, 20–45 cm. high, strictly branched, the branches terminated by rather dense umbel-like cymes. Basal leaves forming a rosette, 2–4 cm. long, broadly oblong-ovate to oblong-lanceolate, obtuse, the cauline lanceolate, acute, 2–3 cm. long, the upper smaller and linear-lanceolate; calyx-lobes linear-subulate, 6 mm. long; corolla rose-colored, the tube 7–10 mm. long, the lobes ovate, obtuse, 5–7 mm. long; anthers 2.5 mm. long, spirally twisted after dehiscing; stigma-lobes flabelliform.

Open meadows and fields, Humid Transition Zone; Puget Sound, Washington, to western Oregon and the northwest coast of California to Mendocino County. Introduced from Europe. June–Aug.

2. *Centaurium floribundum* (Benth.) Robinson. June Centaury. Fig. 3789.

Erythraea floribunda Benth. Pl. Hartw. 322. 1849.

Centaurodes floribundum Kuntze, Rev. Gen. Pl. 2: 426. 1891.

Centaurium floribundum Robinson, Proc. Amer. Acad. 45: 396. 1910.

Stems usually several from the base, 15–50 cm. high. Basal leaves not tufted, obovate, 1.5–2 cm. long, rounded at apex, the cauline oblong-ovate to oblong-linear; flowers numerous, in more or less crowded cymes, those in the forks sessile or subsessile, the others pedicelled; corolla pink, the tube 6–7 mm. long, the lobes oblong to oval, obtuse, 4–5 mm. long; anthers oblong, 1.5–1.7 mm. long; stigma-lobes appressed; capsule narrowly cylindric, 6–7 mm. long.

Moist places, Upper Sonoran Zone; eastern Humboldt and Mendocino Counties, and in the Inner Coast Ranges and Sierra Nevada foothills as far south as Stanislaus and Fresno Counties. Type locality: Sacramento Valley. Collected by Hartweg. June–Sept.

3. *Centaurium Muhlenbergii* (Griseb.) W. F. Wight. Monterey Centaury. Fig. 3790.

Erythraea Muhlenbergii Griseb. Gen. & Sp. Gent. 146. 1839.

Centaurodes Muhlenbergii Kuntze, Rev. Gen. Pl. 2: 426. 1891.

Centaurium Muhlenbergii W. F. Wight, Contr. U.S. Nat. Herb. 11: 450. 1906.

Annual, 8–30 cm. high, simple or more or less branched. Leaves oblong-lanceolate, acutish, 1.5–2.5 cm. long; inflorescence loosely and cymosely paniculate; flowers sessile or subsessile in the forks, the ultimate ones in compact 2–4-flowered cymes, the subtending bracts without rudimentary florets in the axils; calyx-lobes 10 mm. long, narrowly linear, narrowly scarious on the margins; corolla-tube 10–12 mm. long, the lobes about 3.5 mm. long and 1 mm. wide; anthers scarcely 1.5 mm. long, one of the cells longer than the other, not spirally coiled after anthesis; stigma-lobes narrower than long, throat of the marcescent corolla strongly contracted at the summit of the capsule.

Moist ground, Upper Sonoran and Transition Zones; Willamette Valley, Oregon to central California in the Coast Ranges and the Sierra Nevada. Type locality: California. Collected by Douglas. June–Aug.

4. *Centaurium curvistamineum* (Witttr.) Abrams. Washington Centaury. Fig. 3791.

Erythraea curvistamineum Witttr. Eryth. Exsic. 2: no. 21. 1885; reprinted in Bot. Centralb. 26: 317. 1886.

Erythraea minima Howell, Fl. N.W. Amer. 443. 1901.

Centaurium minimum Piper in Piper & Beattie, Fl. N.W. Coast 288. 1915.

Centaurium Muhlenbergii var. *albiflorum* Suksd. Werdenda 1: 30. 1927.

Annual, with simple or considerably branched stems, 3–20 cm. high. Leaves 7–20 mm. long, oblong-elliptic, obtuse, or the upper obtusish; inflorescence loosely flowered, the flowers borne mostly singly in the forks and at the ends of the stems and branches on pedicels 1–12 mm. long, the shortest pedicels rarely less than 3 mm.; calyx-lobes 6–8 mm. long, subulate; corolla pink or rarely white, the tube 8 mm. long, the lobes narrowly oblong-lanceolate, 3.5 to scarcely 4 mm. long; anthers 1 mm. long, the cells of even length at base, slightly sagittate; stigma-lobes fan-shaped, broader than long.

Low moist ground, Arid Transition Zone; Kittitas and Whitman Counties, eastern Washington south, east of the Cascade-Sierra Nevada divide to Esmeralda County, Nevada. Type locality: Washington. June–Sept.

5. *Centaurium Dàvyi* (Jepson) Abrams. Davy's Centaury. Fig. 3792.

Centaurium exaltatum var. *Davyi* Jepson, Man. Fl. Pl. Calif. 762. 1925.

Annual with simple or branched stems, 5–20 cm. high. Leaves elliptic to linear-oblong, 1–2 cm. long, 3–8 mm. wide, obtuse or the uppermost acutish; flowers in the forks and at the ends of the branches, pedicellate, those in the principal forks with pedicels 15–20 mm. long, the others with more or less shorter ones; calyx-lobes 8–10 mm. long, subulate, with scarious margins, keeled on the back; corolla pink with a yellow throat, the tube slightly exceeding the



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3784. *Menodora scabra*
 3785. *Menodora spinescens*
 3786. *Buddleja utahensis*

3787. *Microcala quadrangularis*
 3788. *Centaurium umbellatum*
 3789. *Centaurium floribundum*

3790. *Centaurium Muhlenbergii*
 3791. *Centaurium curvistamineum*
 3792. *Centaurium Davyi*

calyx, the lobes broadly oblong-ovate, 4–6 mm. long, anthers 1.5 mm. long, the cells of even length at base and approximate below the filament attachment; stigmas broadly fan-shaped, widely spreading, style cleft a short distance below the stigma.

Low ground, mainly Upper Sonoran Zone; California Coast Ranges, from Mendocino County to San Luis Obispo County and on Santa Cruz Island. Type locality: West Berkeley, California. April–July.

6. *Centaurium exaltatum* (Griseb.) W. F. Wight. Great Basin Centaury. Fig. 3793.

Cicendia exaltata Griseb. in Hook. Fl. Bor. Amer. 2: 69. pl. 157. 1838.

Erythraea Douglasii A. Gray, Bot. Calif. 1: 480. 1876.

Erythraea exaltata Coville, Contr. U.S. Nat. Herb. 4: 150. 1893.

Centaurium exaltatum W. F. Wight, Contr. U.S. Nat. Herb. 11: 449. 1906.

Stems simple or usually much-branched, 7–35 cm. high. Basal leaves similar to the lower cauline, 2–3 cm. long, oblong-elliptic to oblong-lanceolate, acute, the upper smaller, linear-lanceolate; flowers on pedicels 1–4 cm. long, terminating the branches and in the forks; calyx-lobes subulate, 8–10 mm. long, the margins scarious below; corolla pale pink, sometimes white, the tube 8–10 mm. long, contracted above the ovary, the lobes 3–4 mm. long, oblong, obtuse; anthers oblong, slightly over 1 mm. long; stigma cleft to the base, the lobes fan-shaped, slightly spreading; capsule fusiform; cylindric, 7 mm. long.

Moist places, Upper Sonoran Zone; eastern Washington and eastern Oregon, south, east of the Sierra Nevada, to the deserts of southern California and adjacent Lower California, east to Idaho, Nevada, Utah, and Arizona. Type locality: "Between the Kettle Falls and Narrows of the Columbia River." Collected by Douglas. May–Aug. Desert Centaury.

7. *Centaurium trichanthum* (Griseb.) Robinson. Alkali Centaury. Fig. 3794.

Erythraea trichantha Griseb. Gen. & Sp. Gent. 146. 1839.

Centauroides trichanthum Kuntze, Rev. Gen. Pl. 2: 426. 1891.

Centaurium trichanthum Robinson, Proc. Amer. Acad. 45: 397. 1910.

Stems simple below or occasionally branched to the base, corymbosely branched above, 8–35 cm. high. Leaves ovate to lanceolate or narrowly oblong, 1–3 cm. long; flowers commonly numerous in open or sometimes crowded cymes, subsessile or commonly on pedicels, 4–10 mm. long, or in the form with congested inflorescence sessile or subsessile; calyx-lobes 8–14 mm. long, subulate, neither scarious margined nor keeled; corolla pink with a creamy white throat, the tube slender, well exceeding the calyx-lobes and constricted above the ovary, the lobes 8–10 mm. long, 2.5–4 mm. broad; anthers linear, 3.5 mm. long; stigma-lobes closely appressed, 0.5 mm. high, narrowly cuneate, and not as broad as long; style not cleft below the stigma-lobes.

Moist places usually along streams, Upper Sonoran and Transition Zones; California Coast Ranges from Siskiyou County to San Mateo County. Type locality: California. Collected by Douglas. May–Aug.

8. *Centaurium venustum* (A. Gray) Robinson. Canchalagua or Beautiful Centaury. Fig. 3795.

Erythraea venusta A. Gray, Bot. Calif. 1: 479. 1876.

Centauroides venustum Kuntze, Rev. Gen. Pl. 2: 426. 1891.

Centaurium venustum Robinson, Proc. Amer. Acad. 45: 397. 1910.

Stems usually simple below, corymbosely branched above, 8–50 cm. high. Leaves ovate to narrowly oblong, 1–2 cm. long; flowers numerous except in dwarf plants, those in the principal forks on pedicels 15–25 mm. long, the others on shorter ones; calyx-lobes 8–9 mm. long, subulate; corolla pink, and usually with red spots on the white throat, the lobes lanceolate to oblong-ovate, 5–12 mm. long and up to 6 mm. broad, the tube about as long as the lobes; anthers 4–6 mm. long; stigma-lobes broadly fan-shaped, broader than long, diverging; style cleft for a short distance below the stigma; seeds globular.

Dry slopes and mesas, often among shrubs, Sonoran Zones; Sierra Nevada foothills from Butte County southward to cismontane southern California and the western rim of the deserts, and adjacent Lower California. Type locality: southern California, but no definite station cited. May–Aug. The plants north of Kern County have smaller flowers and smaller stigmas. Perhaps they should be considered a geographical subspecies.

3. *EUSTOMA* Salisb. Parad. Lond. 1: pl. 34. 1806.

Annual herbs with erect usually branched glaucous stems and opposite sessile or clasping leaves. Flowers solitary or paniculate, axillary or terminal, blue, purple or white. Calyx deeply cleft into 5–6 lanceolate, acuminate and keeled lobes. Corolla broadly campanulate, divided into 5–6 oblong or obovate lobes, convolute in the bud and usually erose-denticulate. Stamens 5–6, inserted on the corolla throat, the filaments filiform; anthers oblong, versatile, becoming slightly recurved or remaining straight after anthesis. Ovary 1-celled; style filiform; stigma 2-lobed, the lobes lamellate. Fruit a 2-valved, oblong or ovoid capsule. Seeds numerous, small, faveolate. [Name Greek, meaning open-mouth, in reference to the corolla.]

A genus of 4 species, native of the southern United States, Mexico, West Indies, and northern South America. Type species, *Eustoma silenifolium* Salisb.

1. *Eustoma exaltatum* (L.) Griseb. Tall Eustoma. Fig. 3796.

Gentiana exaltata L. Sp. Pl. ed. 2. 331. 1762.

Lisianthus exaltatus Lam. Encycl. 3: 662. 1789.

Eustoma silenifolium Salisb. Parad. Lond. 1: pl. 34. 1806.

Chlora exaltata Griseb. Gen. & Sp. Gent. 118. 1839.

Eustoma exaltatum Griseb. in A. DC. Prod. 9: 51. 1845.

Annual or short-lived perennial, with a taproot, the stems solitary or sometimes 2-3, erect, branched above, 3-7 dm. high, herbage glaucous. Basal leaves obovate to broadly spatulate, narrowed below to a broad petiole, stem-leaves sessile, clasping and often slightly connate, broadly to rather narrowly oblong, the lower obtuse, the upper acute, 2-5 cm. long, mostly 3-5-nerved, those of the inflorescence reduced to subulate bracts; flowers in an open cymose panicle; calyx-lobes subulate, 10-15 mm. long; corolla blue or often white, the tube about 1 cm. long, the lobes oblong-obovate, 1.5-2 cm. long; stigma-lobes oblong; style 4-5 mm. long; capsule oblong-ellipsoid, 8-12 mm. long, very obtuse at apex.

Along streams, Sonoran Zones; along the Santa Ana River in San Bernardino and Orange Counties, also in the Colorado Desert at Thousand Palms, Palm Canyon, Mason Valley, and Westmoreland; east to Arizona, New Mexico, Texas, and Florida, south to Lower California, central Mexico, and the West Indies. Type locality: "In America." Jan.-Dec.

4. GENTIANA [Tourn.] L. Sp. Pl. 227. 1753.

Erect annual or perennial, glabrous or puberulent herbs, with mostly sessile, opposite or rarely verticillate leaves. Flowers solitary or clustered, terminal or axillary, showy, blue, purple, white, or rarely yellow, calyx tubular, 4-7-cleft. Corolla tubular, campanulate, funnelform or salverform, 4-7-lobed, often with plaits produced into lobes or teeth in the sinuses between the lobes. Stamens as many as the corolla-lobes and inserted alternate with them, included; anthers versatile, straight or recurved after anthesis. Stigma cleft into 2 lamellate lobes; style short or none; ovary 1-celled; ovules numerous. Capsule sessile or stipitate, 2-valved. Seeds numerous, winged or wingless. [Named for King Gentius of Illyria.]

A genus of about 300 species of wide distribution in the arctic and the cooler parts of the north temperate zone; also in the Andes, New Zealand, Australia, and Tasmania. Type species, *Gentiana lutea* L.

Calyx with an intracalyxine membrane inside the tube; corolla plicate, with cleft or merely emarginate plaits in the sinuses; filaments attached near the middle of the corolla-tube; ovary bearing nectariferous pits on its base. (Subgenus *Eugentiana*)

Plaits of the sinuses 2-cleft; leaves not white-margined; flowers usually cymose. (Section *Pneumonanthe*)

Perennials; stems striate; seeds winged.

Intracalyxine membrane entire or 5-lobed.

Membrane entire; dwarf alpine plants, 5-15 cm. high.

1. *G. Newberryi*.

Membrane 5-lobed; plants taller, 20 cm. or more high.

Flowers sessile in the axils of 2 bracts.

Floral bracts linear-lanceolate; calyx-lobes linear, unequal, 2 often about 2 mm. long, the others reduced to mucronate points.

2. *G. affinis*.

Floral bracts ovate or ovate-lanceolate; calyx-lobes lanceolate or oblanceolate, 8-12 mm. long, well-exceeding the tube.

3. *G. oregana*.

Flowers, at least some of them, on pedicels 10-15 mm. long.

4. *G. sceptrum*.

Intracalyxine membrane deeply 2-lobed.

Corolla-lobes finely serrulate; lobes of the plaits in the sinuses produced into capillary setae.

Leaves ovate-lanceolate, the upper pair almost concealing the flowers; calyx-tube 12-15 mm. long; lobes of the plaits with several capillary setae about equaling the corolla-lobes.

5. *G. setigera*.

Leaves oblong-lanceolate, the upper pair reduced and not concealing the flowers; lobes of the plaits with 2 capillary setae about half as long as the corolla-lobes.

6. *G. bisetata*.

Corolla-lobes with entire margins; lobes of the plaits acute or short-acuminate, but not forming capillary setae.

7. *G. calycosa*.

Annuals; stems smooth; flowers cymose; seeds oblong, not winged.

8. *G. Douglasiana*.

Plaits in the sinuses broad and merely emarginate; leaves white-margined; flowers solitary at the ends of the branches; intracalyxine membrane nearly entire, only shallowly notched between the calyx-lobes; seeds not winged. (Section *Chondrophylla*)

Corolla greenish purple; capsule long-stipitate and exserted beyond the calyx, ellipsoid.

9. *G. Fremontii*.

Corolla azure-blue; capsule subsessile, linear-oblong, enclosed in the calyx.

10. *G. prostrata americana*.

Calyx without an intracalyxine membrane; corolla without plaits in the sinuses; nectariferous pits borne well down on the corolla-tube. (Subgenus *Gentianella*)

Corolla-tube with a fringe of laciniae on the throat; style none; seeds not winged. (Section *Amarella*)

Flowers clustered; plants 30-40 cm. high.

11. *G. Amarella*.

Flowers solitary; plants 5-10 cm. high.

12. *G. tenella*.

Corolla-tube without laciniae; style 1-5 mm. long. (Section *Crossopetalum*)

Plants always with a simple stem; calyx-lobes never with a black midrib; corolla campanulate; seeds smooth, cylindric with an enlarged collar-like center.

13. *G. simplex*.

Plants with a simple or branched stem; calyx-lobes with a black excurrent midrib; seeds oval, covered with minute swollen processes.

14. *G. holopetala*.

1. *Gentiana Newberryi* A. Gray. Alpine or Newberry's Gentian. Fig. 3797.

Gentiana Newberryi A. Gray, Proc. Amer. Acad. 11: 84. 1876.
Pneumonanthe Newberryi Greene, Leaflets Bot. Obs. 1: 71. 1904.
Dasystephania Newberryi Arth. Torrey 22: 30. 1922.

Dwarf alpine, with a perennial taproot and 1 to several more or less decumbent flowering stems, 4–15 cm. high. Basal leaves forming a rosette, spatulate, narrowed to a broad petiole, 2–7 cm. long, 4–12 mm. broad, the lower stem-leaves similar but smaller, the upper sessile, oblanceolate to oblong-linear, 10–15 mm. long; flowers solitary, sessile in the axil of the uppermost pair of leaves, or occasionally subtended by 1–3 smaller ones on lateral branches; calyx-tube 8–14 mm. long, the lobes 6–12 mm. long, narrowly oblong-elliptic, acute; intracalyxine membrane entire; corolla broadly funnelform, white within and dotted with greenish spots, the lobes pale blue to deep violet, the tube beneath the lobes often greenish purple or greenish brown, 2–3 cm. long, the lobes 5–8 mm. long, narrowly obovate, mucronate, slightly spreading; plaits 2-cleft with subulate tips; style none; capsule ovoid, 10–12 mm. long; stipe 8 mm. long; seeds broadly winged all around.

Alpine or subalpine meadows, Boreal Zones; Cascade Mountains of southern Oregon south to the Trinity Mountains and the southern Sierra Nevada, California. Type locality: "Crater Pass," Oregon. Aug.–Sept.

2. *Gentiana affinis* Griseb. Prairie Gentian. Fig. 3798.

Gentiana affinis Griseb. in Hook. Fl. Bor. Amer. 2: 56. 1838.
Pneumonanthe affinis Greene, Leaflets Bot. Obs. 1: 71. 1904.
Dasystephania affinis Rydb. Bull. Torrey Club 33: 149. 1906.

Stems usually several from the stout perennial root, erect, or somewhat decumbent, 15–45 cm. high. Leaves usually many, on account of the short internodes, the lower ovate-lanceolate, the uppermost linear-lanceolate to linear, 2–3 cm. long; flowers racemously disposed, 4–12, the lower on slender ascending branchlets, each flower subtended by a pair of narrowly linear bracts; calyx-lobes, linear, more or less unequal, the longer equaling the tube; corolla 2–3 cm. long, narrowly funnelform, blue, the lobes 3–5 mm. long, slightly tinged with green on their backs; plaits in the sinuses divided into 2 acuminate teeth about half the length of the corolla-lobes; capsule 12–15 mm. long; stipe 9–10 mm. long; body of the seed oval and flattened, the wing nearly as broad as the body.

Meadows and prairies, Transition and Boreal Zones; eastern British Columbia and Saskatchewan south to northeastern Washington (Spokane County), Idaho, eastern Nevada, Utah, and Colorado. Type locality: "Carlton House to Edmonton House." Collected by Drummond. Trappers Gentian. June–Sept.

Gentiana affinis var. *parvidentata* Kusnezow, Act. Hort. Petrop. 15: 201. 1898. Differs from the typical species mainly in the calyx-lobes, which are much-reduced, 2 of them usually about 2 mm. long, the others reduced to mere mucronations. This variety occurs in eastern Oregon from Union County to Klamath County and to Modoc County, California; eastward of this it merges into the variety *Forwoodii* (A. Gray) Kusnezow, a form with the calyx-lobes obsolete. Type locality: not given.

3. *Gentiana oregana* Engelm. Oregon Gentian. Fig. 3799.

Gentiana affinis var. *ovata* A. Gray, Bot. Calif. 1: 412. 1876.
Gentiana oregana Engelm. ex A. Gray, Syn. Fl. N. Amer. 2: 122. 1878.
Dasystephania oregana Rydb. Bull. Torrey Club 40: 464. 1913.

Stems erect or slightly decumbent at base, rather stout, usually several from a stout perennial root, simple or with a few short branchlets above. Leaves ovate or oblong, 2–4 cm. long; flowers few at the summit, or several and racemously disposed, sessile; bracts ovate to oblong-lanceolate; calyx-lobes oblong to oblong-lanceolate, subequal, 8–12 mm. long; corolla broadly funnelform, 3–4 cm. long, blue, the lobes round-ovate, 6–10 mm. long, often tinged or dotted with green on the back; plaits in the sinuses lobed and laciniate-dentate, about two-thirds the length of the corolla-lobes; capsule 25–35 mm. long, fusiform; stipe about 15 mm. long; seed broadly winged all around.

Meadows and open woods, Transition and Canadian Zones; eastern British Columbia and western Idaho, south through eastern Washington and eastern Oregon to northeastern California; also along the coast from Curry County, Oregon, to Marin County, California. The coastal form is the plant Gray described as *G. affinis* var. *ovata*. It differs slightly from typical *G. oregana*, possibly enough to merit varietal recognition. Type locality: Blue Mountains, Oregon. June–Sept.

4. *Gentiana scéptrum* Griseb. Scepter or King's Gentian. Fig. 3800.

Gentiana scéptrum Griseb. in Hook. Fl. Bor. Amer. 2: 59. pl. 145. 1838.
Gentiana Menziesii Griseb., loc. cit.
Gentiana Orfordii Howell, Fl. N.W. Amer. 446. 1901.
Pneumonanthe scéptrum Greene, Leaflets Bot. Obs. 1: 71. 1904.

Stems erect, solitary or few from a short stout perennial rootstock, 5–12 dm. high. Leaves lanceolate to linear-lanceolate, rarely ovate-lanceolate, 2–8 cm. long, the lowest reduced to connate bracts; flowers usually several, racemously disposed, some of the flowers with bracts closely subtending the calyx, others without bracts and therefore pedicelled; calyx-lobes lanceolate, 8–15 mm. long, the tube 10–12 mm. long; corolla blue, often with green dots within, 3–4 cm. long, the tube broadly funnelform, the lobes about 8 mm. long, rounded, the plaits with low rounded or truncate entire summits; anthers 6–7 mm. long; capsule 17–20 mm. long, fusiform or narrowly ellipsoid; stipe stout, 10–12 mm. long; seeds about 1.5 mm. long, the ends with narrow terminal wings about as long as the body.

Wet meadows and bogs; Humid Transition Zone; Vancouver Island, British Columbia, western Washington



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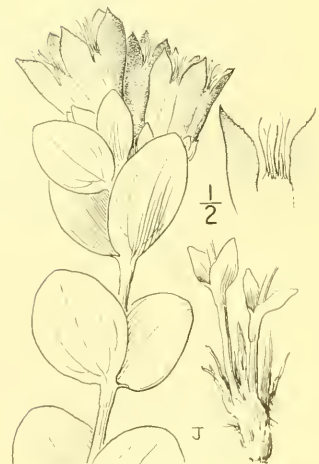
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3793. *Centaurium exaltatum*
 3794. *Centaurium trichanthum*
 3795. *Centaurium venustum*

3796. *Eustoma exaltatum*
 3797. *Gentiana Newberryi*
 3798. *Gentiana affinis*

3799. *Gentiana oregana*
 3800. *Gentiana sceptrum*
 3801. *Gentiana setigera*

and Oregon, and the coast of California to Mendocino County. Type locality: Fort Vancouver, Washington. June–Sept.

Gentiana sceptrum var. *humilis* Engelm. ex A. Gray, Bot. Calif. 1: 483. 1876. This is a smaller plant with smaller oblong-elliptic leaves that is found along the coast of southern Oregon and California. The type came from the Mendocino Plains, California.

5. *Gentiana setigera* A. Gray. Elegant or Mendocino Gentian. Fig. 3801.

Gentiana setigera A. Gray, Proc. Amer. Acad. 11: 84. 1876.

Gentiana californica Kusnezow, Act. Hort. Petrop. 13: 59. 1893.

Pneumonanthe setigera Greene, Leaflets Bot. Obs. 1: 71. 1904.

Stems stout, several from the crown of stout fleshy roots, erect or ascending, 20–30 cm. high. Leaves about six pairs, rather thick, suborbicular to broadly ovate, 2.5–5 cm. long; flowers solitary or usually several in the axil of the upper pair of leaves, these little reduced and concealing much of the flowers; sometimes with one or two flowers from the next pair of leaves, sessile or short-peduncled and bearing a pair of foliaceous bracts closely subtending the calyx; calyx-tube 12–15 mm. long, the lobes mostly oblong-oblancoate, 12–20 mm. long; corolla blue, 3–4 cm. long, broadly funnelform, the lobes 7–12 mm. long, 7–8 mm. broad, erose, rounded at apex and apiculate, the lobes of the plaits bearing 2–8 capillary bristles about equaling the corolla-lobes; anthers 3–4 mm. long; capsule ellipsoid, 18–20 mm. long; stipe 16–18 mm. long; seed about 1 mm. long and about as wide, evenly winged all around.

Wet meadows and bogs, Transition and Canadian Zones; Salmon Mountains, Trinity Mountains, and on Red Mountain, northern Mendocino County, California. Type locality: Red Mountain, Mendocino County. July–Sept.

6. *Gentiana bisetata* Howell. Waldo Gentian. Fig. 3802.

Gentiana bisetata Howell, Fl. N.W. Amer. 445. 1901.

Stems several from a stout root crown, erect or ascending, 20–45 cm. high. Leaves elliptic-oblong to oblong-lanceolate, 2.5–6 cm. long, the upper pair reduced and not concealing the flower; flowers solitary or sometimes 3–4 at the summit, sessile in the axils of the closely subtending bracts; calyx-tube pale, 8–10 mm. long, the lobes lanceolate-oblong, 5–8 mm. long; corolla blue, funnelform, 2.5–3.5 cm. long, the lobes 14–16 mm. long, about 6 mm. wide, acutish at apex but not apiculate, lobes of the plaits with 2 capillary bristles, about half the length of the corolla-lobes; anthers oblong, 3–4 mm. long; capsule narrowly ellipsoid, stipitate; seeds oblong, broadly winged all around.

In bogs and along streams, Transition Zone; eastern slopes of the Coast Ranges west of Kirby and Waldo, Josephine County, Oregon. Type locality: "In marshes, eastern base of the Coast Mountains, near Waldo, Oregon." Aug.–Sept.

7. *Gentiana calycosa* Griseb. Explorers' Gentian. Fig. 3803.

Gentiana calycosa Griseb. in Hook. Fl. Bor. Amer. 2: 58. pl. 146. 1838.

Gentiana calycosa var. *stricta* Griseb. loc. cit.

Gentiana Gormanii Howell, Fl. N.W. Amer. 446. 1901.

Pneumonanthe calycosa Greene, Leaflets Bot. Obs. 1: 71. 1904.

Dasystephana calycosa Rydb. Bull. Torrey Club 40: 464. 1913.

Gentiana Cusickii Gandoger, Bull. Soc. Bot. Fr. 65: 60. 1918.

Stems several to many from a stout simple or branched root-crown, erect or ascending, 15–35 cm. high. Leaves round-oval to ovate, 2–4 cm. long, abruptly rounded or subcordate at base; flowers 1–3 or solitary at the apex and sometimes with 1 or 2 in the upper axils, these sessile or pedunculate, closely subtended by a pair of narrowly ovate or lanceolate bracts; calyx-tube pedicels obsolete; calyx-tube 6–8 mm. long, the lobes oblong to oblong-lanceolate, equaling or exceeding the tube; corolla blue, 25–35 mm. long, broadly funnelform-campanulate, the lobes 7–10 mm. long, broadly ovate to obovate, rounded at apex or mucronate; lobes of the plaits acute or acuminate, about half to nearly as long as the corolla-lobes; anthers 3–4 mm. long; capsule 16–17 mm. long, the stipe about 10 mm. long; body of the seed about 1.5 mm. long, the wings narrow on the side, prolonged at the ends.

Alpine meadows, Boreal Zones; Washington, both the Olympic and Cascade Mountains south to the Trinity Mountains and the southern Sierra Nevada, California, east to Montana and Wyoming. Type locality: Mount Rainier, Washington. July–Sept. Mountain Bog Gentian.

8. *Gentiana Douglasiana* Bong. Douglas' Gentian. Fig. 3804.

Gentiana Douglasiana Bong. Mém. Acad. St. Pétersb. VI. 2: 156. pl. 6. 1831.

Annual, with a slender, simple or commonly cymosely branched stem, 6–15 cm. high. Basal leaves ovate to round-ovate, 6–9 mm. long; stem-leaves rather distant, ovate, 4–6 mm. long, divaricately spreading; flowers terminating the branches or on slender peduncles; bracts closely subtending the calyx, ovate, 2–3 mm. long; calyx 4–5 mm. long, the lobes lanceolate, shorter than the tube; corolla white, 8–12 mm. long, funnelform, the lobes oblong, shorter than the tube, the plaits in the sinuses with a 2-lobed appendage over half the length of the corolla-lobes; capsule obovoid, stipitate; seeds oblong, apiculate at both ends, 1.5 mm. long.

Alpine bogs and open meadows, Boreal Zones; Alaska to Vancouver Island (Port Renfrew) and the Cascade Mountains, Washington, where it has been collected by J. W. Thompson in Snoqualmie Pass, at an elevation of 3,000 feet. Type locality: mountains of western North America. Collected by Douglas. July–Sept.

9. *Gentiana Fremontii* Torr. Moss Gentian. Fig. 3805.

Gentiana Fremontii Torr. in Frem. Rep. 94. 1843.

Gentiana viridula Parish, Bot. Gaz. 38: 461. 1904.

Chondrophylla Fremontii A. Nels. Bull. Torrey Club 31: 245. 1904.

Annual or biennial, simple or branched from or near the base, 3–10 cm. high. Leaves all rather broadly scarious-margined, mucronate, the basal orbicular-obovate, 5–6 mm. long, the stem-leaves erect, oblong-oblancoate or the uppermost linear, 4–6 mm. long; flowers solitary and terminal; calyx narrowly funnelform, about 7 mm. long, simulating the leaves, the lobes acute, scarious-margined; corolla 5–7 mm. long, the lobes greenish with white margins, the plaits in the sinuses white tinged with blue, their lobes minutely toothed; capsule becoming well-exserted on the elongated stipe, 2-valved at the summit, the valves spreading, and suggesting a large 2-lobed stigma; seeds 1 mm. long, ellipsoid, apiculate.

Bogs or springs, Boreal Zones; known in the Pacific States only in the San Bernardino Mountains, California, where it has been found on the South Fork of the Santa Ana River and at Dry Lake. In the Rocky Mountains it ranges from Alberta to Wyoming, Colorado, and Utah. This species is closely related to *Gentiana humilis* Steven of Siberia, and by some considered conspecific, but that name is a homonym. Type locality: Wind River Mountains, Wyoming. June–Aug.

10. *Gentiana prostrata* var. *americana* Engelm. Pigmy Gentian. Fig. 3806.

Gentiana prostrata var. *americana* Engelm. Trans. St. Louis Acad. 2: 217. pl. 9. figs. 10–15. 1863.

Chondrophylla americana A. Nels. Bull. Torrey Club 31: 245. 1904.

Low biennial, 2–10 cm. high, often branching from the base and decumbent. Leaves ovate to oval, or the basal suborbicular, 2–3 mm. long, narrowly white-margined; flowers terminal, solitary; calyx 8–10 mm. long, the teeth 2–3 mm. long; corolla blue, the tube slightly exserted, the lobes narrowly ovate, 3–4 mm. long, acute, the plaits in the sinuses ovate, acute or notched; capsule linear-oblong, short-stipitate and enclosed in the corolla.

Mountain meadows, Boreal Zones; Alaska, southward in the Rocky Mountains to Alberta and Colorado. Known in the Pacific States only in the White Mountains, California, where it was collected in the McAfee Meadows by Victor Duran. Type locality: "On Mount Flora and other alpine peaks of the Snowy Range, Colorado." July–Aug.

11. *Gentiana Amarélla* var. *acuta* (Michx.) Herder. Northern Gentian. Fig. 3807.

Gentiana acuta Michx. Fl. Bor. Amer. 1: 177. 1803.

Gentiana Amarélla var. *acuta* Herder, Act. Hort. Petrop. 1: 428. 1872.

Gentiana anisosepala Greene, Pittonia 3: 309. 1898.

Amarélla Copelandii Greene, Leaflets Bot. Obs. 1: 53. 1904.

Amarélla californica, *A. Lambertii*, *A. Macounii* Greene, op. cit. 54.

Annual with a simple or branched, leafy stem, 10–40 cm. high. Basal and lower stem-leaves spatulate to obovate, obtuse or rounded at apex, the upper lanceolate, acute, rounded or subcordate at base, sessile or clasping, 15–35 mm. long; flowers usually many, racemose-spicate, on slender ascending branchlets, pedicels slender, of unequal lengths; calyx 5–10 mm. high, deeply 5-parted, the lobes lanceolate; corolla blue, tubular-campanulate 8–12 mm. high, 5-lobed or rarely 4-lobed, the lobes lanceolate, acute, each with a fimbriate crown at the base; capsule sessile, fusiform-cylindric, dehiscent across the summit; seeds subspherical, 0.5 mm. in diameter.

Moist places, Boreal and Transition Zones; Alaska to northern Lower California and across the continent. Closely related to the typical species of Eurasia. Both the Old World and the New World plants exhibit many variations and a number of specific and varietal names have been proposed, but Dr. Fernald (Rhodora 19: 149–151) considers them all as constituting a single specific unit. Type locality: in high mountains of Carolina and in Canada near "Tadoussack" (probably Tadoussac, Quebec).

In the Pacific States the form, for which Greene proposed the name *Amarélla Copelandii*, is the most marked. Its calyx-lobes are often 10–12 mm. long, and narrowly linear-lanceolate; the corolla 12–15 mm. long, and the setae of the crown nearly as long as the lobes. It has been collected on Mount Eddy and on the upper Sacramento River, California. June–Aug.

12. *Gentiana tenella* Rottb. Danes' Gentian. Fig. 3808.

Gentiana tenella Rottb. Kjøb. Selsk. Laerd. & Vidensk. 10: 436. 1770.

Gentiana monantha A. Nels. Bull. Torrey Club 31: 244. 1904.

Amarélla monantha Rydb. Bull. Torrey Club 33: 148. 1906.

Annual with a slender root, the stems branching near the base, and more or less caespitose, 3–8 cm. high, diminutive plants often unbranched. Basal leaves oblanceolate or spatulate, 10–15 mm. long, stem-leaves similar but smaller; flowers solitary on slender elongated peduncles terminating the branches; calyx 4-parted, the divisions lanceolate, 6–8 mm. long; corolla narrowly funnelform, white or tinged with green and blue about a third to a half longer than the calyx, bearing a fringed crown at the throat, the lobes lanceolate, acute; free portion of filaments very short; ovary cylindric; stigma sessile.

Alpine meadows, Boreal Zones; Arctic regions of both hemispheres. In North America ranging from Alaska south through the Rocky Mountains to Colorado and northern Arizona. In the Pacific States it has been collected in the Sierra Nevada from Mono County to Mount Whitney, California. Type locality: probably Europe. July–Sept.

13. *Gentiana simplex* A. Gray. One-flowered or Hikers' Gentian. Fig. 3809.

Gentiana simplex A. Gray, Pacif. R. Rep. 6: 87. pl. 16. 1857.

Anthopogon simplex Rydb. Fl. Rocky Mts. 659. 1917.

Annual with a solitary unbranched erect stem, 5–25 cm. high. Leaves in 3–6 pairs, distributed along the stem, the lowest pair clasping, the upper merely sessile, oblong-lanceolate, or the uppermost oblong-linear, 10–18 mm. long; flower solitary on a terminal bractless peduncle 2–6 cm. long; calyx 1.5–2 cm. high, mostly 4-lobed to about the middle, the lobes lanceolate, acute; corolla blue, 25–40 mm. long, mostly 4-lobed, the lobes about equaling the tube, rounded at the apex, their margins irregularly and somewhat laciniately toothed all around; stipe about as long as the capsule; seeds striate, otherwise smooth, or slightly roughened at each end.

Mountain meadows, Boreal Zones; Cascade Mountains, Douglas County, Oregon, south to the Siskiyou and Trinity Mountains, Sierra Nevada and San Bernardino Mountains, California, also in western Nevada and central Idaho. Type locality: Upper Klamath Lake, Oregon. July–Sept.

14. *Gentiana holopétala* (A. Gray) Holm. Sierra or Tufted Gentian. Fig. 3810.

Gentiana serrata var. *holopetala* A. Gray, Bot. Calif. 1: 481. 1876.

Gentiana holopetala Holm, Ottawa Nat. 15: 110. 1901.

Annual, 4–40 cm. high, the smaller plants simple, the larger branched and often caespitose, the short branches terminated by the elongated 1-flowered peduncles. Leaves crowded at the base, spatulate-obovate, 1–3 cm. long, those on the stems linear-oblong, acute or acuminate; bracts none; calyx 1–3 cm. long, 4-lobed, the lobes usually longer than the tube, acuminate, scarious-margined, with a dark green midrib; corolla blue, funnellform, 3–5 cm. long, 4-lobed, the lobes oblong, obtuse, about half the length of the tube, entire or erose; stamens with filaments free nearly to the base; capsule fusiform, 9–12 mm. long, the stipe nearly as long; seeds oval, dark brown, covered with balloon-like processes.

Mountain meadows, Boreal Zones; Sprague River, Klamath County, Oregon, and in the Sierra Nevada from Tuolumne County to Tulare County, also Bear Valley, San Bernardino Mountains, California. Type locality: Tuolumne Soda Springs, California. July–Sept.

5. *SWÉRTIA* L. Sp. Pl. 226. 1753.

Perennial or biennial herbs, with erect, often hollow stems and opposite or verticillate leaves. Flowers rather large, 4–5-merous, in a terminal thyrus or cymose panicle. Calyx 4–5-parted into narrow lobes. Corolla 4–5-parted, rotate, the lobes convolute in the bud, each bearing 1 or 2 fimbriate glands on the inner surface, the tube very short, often bearing a corona on the throat, the lobes of the corona free, or sometimes contiguous with the corolla-lobe and forming a pocket subtending and sometimes partly enclosing the gland. Stamens 4 or 5, the filaments subulate or filiform, inserted on the base of the corolla; anthers oblong, versatile. Ovary ovoid, sessile, flattened laterally or dorso-ventrally, tapering in to the short or often slender style; stigma small, 2-lobed. Capsule coriaceous, more or less flattened either laterally or dorso-ventrally. Seeds few, more or less compressed, faveolate, margined or narrowly winged. [Name in honor of Emanuel Sweert, Dutch botanist of the sixteenth century.]

A genus of about 70 species, natives of Europe, Asia, Africa and North America. Type species, *Swertia perennis* L.

Corolla-lobes each bearing 2 glands on the inner surface; capsule compressed contrary to the partition.

Flowers 5-merous; glands rather distant, orbicular, fringed only on the upper edge; style none.

1. *S. perennis obtusa*.

Flowers 4-merous; glands approximate, oblong, fringed all around the edge.

2. *S. radiata*.

Corolla-lobes each bearing 1 gland; capsule flattened parallel with the valves; flowers normally 4-merous.

Corolla without a crown; gland orbicular; leaves not white-margined, whorled.

3. *S. fastigiata*.

Corolla with a crown, the scales adnate to the gland and forming a pocket that subtends or more or less encloses part of the gland; leaves usually white-margined.

Gland entirely adnate to the corolla-lobe, forming an oblong or linear sometimes lobed pit, more or less fringed on the margin.

Stem-leaves opposite.

Inflorescence a narrow spike-like thyrus, often interrupted below; gland entire at apex; leaves white-margined.

Gland oblong, enclosed below by the pocket-like crown-scale; leaves white-margined.

Herbage minutely puberulent.

4. *S. albicaulis*.

Herbage glabrous.

5. *S. nitida*.

Gland quadrate, enclosed to the middle or a little more by the pocket-like scale, the exposed portion quadrate.

6. *S. neglecta*.

Inflorescence on open panicle; gland lobed at apex or lunate.

Gland shallowly 2-lobed at apex; herbage puberulent.

7. *S. puberulenta*.

Gland broad, lunate, subtended by a broad saccate crown-scale.

8. *S. Parryi*.

Stem-leaves in whorl of 3 or more; gland oblong, lobed at apex.

9. *S. albomarginata*.

Gland adnate to the crown-scale forming a tube, 2-lobed at apex and free from the corolla-lobe; leaves whorled, white-margined.

10. *S. tubulosa*.



3802



3803



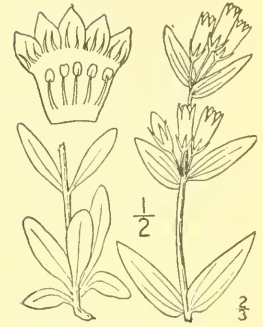
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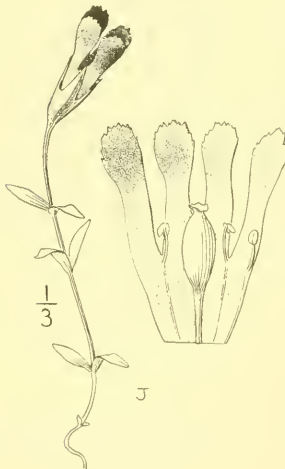
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3810

3802. *Gentiana bisetata*
 3803. *Gentiana calycosa*
 3804. *Gentiana Douglasiana*

3805. *Gentiana Fremontii*
 3806. *Gentiana prostrata*
 3807. *Gentiana Amarella*

3808. *Gentiana tenella*
 3809. *Gentiana simplex*
 3810. *Gentiana holopetala*

1. *Swertia perennis* var. *obtusa* (Ledeb.) Griseb. Felwort or Swertia. Fig. 3811.

Swertia obtusa Ledeb. Mém. Acad. St. Pétersh. 5: 526. 1812.

Swertia perennis var. *obtusa* Griseb. in Hook. Fl. Bor. Amer. 2: 66. 1838.

Swertia Covillei Greene, Leaflets Bot. Obs. 1: 77. 1904.

Swertia occidentalis Greene, Pittonia 4: 184. 1900.

Swertia ovalifolia Greene, op. cit. 185.

Stem erect, simple, 1–3 dm. high, from a slender rootstock with fleshy-fibrous roots. Basal leaves, 4–15 cm. long, elliptic to oblanceolate, the blades about equaling to much longer than the petioles, the stem-leaves few, alternate or the upper opposite, oblong or oblong-lanceolate, sessile; raceme usually elongated; pedicels of the lowest flowers often 3–4 cm. long, bearing a bract near the middle, the upper pedicels bractless and shorter; flowers 5-merous or rarely 4-merous; calyx-lobes 4–5 mm. long, subulate; corolla-lobes oblong to oblong-oval, obtuse, 8–10 mm. long, greenish white veined or tinged with bluish purple, the glands suborbicular, fringed all around with slender setae; capsule ellipsoid, flattened, 9–10 mm. long.

Wet places in canyons and meadows, Boreal Zones; Alaska to California and in the Rocky Mountains to Utah and Colorado. In the Pacific States it occurs in the Blue Mountains (*Swertia ovalifolia*) and Wallowa Mountains (*Swertia occidentalis*), Oregon, and in the Sierra Nevada from Mariposa County to Tulare County (*Swertia Covillei*), California. Type locality: Great Altai Mountains, Asia. July–Sept.

2. *Swertia radiata* (Kell.) Kuntze. Giant Swertia or Deer Tongue. Fig. 3812.

Frasera speciosa Dougl. ex Griseb. in Hook. Fl. Bor. Amer. 2: 66. pl. 153. 1838.

Tessaranthium radiatum Kell. Proc. Calif. Acad. 2: 144. fig. 41. 1862.

Swertia radiata Kuntze, Rev. Gen. Pl. 2: 430. 1893.

Tessaranthium speciosum Rydb. Fl. Rocky Mts. 666, 1065. 1917.

Stems solitary from a large taproot, stout, 6–18 dm. high, 2–3 cm. thick; herbage minutely puberulent. Basal leaves oblanceolate to obovate, gradually or rather abruptly narrowed to a broad petiole, 15–25 cm. long, acute; stem-leaves sessile or the lowest short-petioled, lanceolate or somewhat oblanceolate, in whorls of 3–7; inflorescence a rather narrow panicle, 25–60 cm. long; pedicels stout, 3–9 cm. long; calyx-lobes narrowly lanceolate, 15–20 mm. long; corolla-lobes about equaling the calyx, greenish white, flecked with purple; glands 2, spindle-shaped, prominently lacinate on the margins; scales of the crown deeply lacinate at the apex, extending to about the middle of the gland; capsule 15–18 mm. long; seeds flattened and narrowly wing-margined.

Grassy slopes and meadows, Boreal Zones; eastern Washington, Idaho, and Montana, south to California, Arizona, and New Mexico. In the Pacific States it is local in eastern Washington (Naches River, Henderson); in eastern Oregon it is in the Blue, Powder, and Steen Mountains; in California it is in the Warner Mountains, the North Coast Ranges to Lake County and the Sierra Nevada to Fresno County. Type locality: "On the low hills near Spokane and Salmon Rivers and subalpine parts of the Blue Mountains, near the Kooskooska River." Collected by Douglas. June–Aug.

5. *Swertia fastigiata* Pursh. Clustered Swertia. Fig. 3813.

Swertia fastigiata Pursh, Fl. Amer. Sept. 1: 101. 1814.

Frasera thyrsiflora Hook. Kew Journ. Bot. 3: 288. 1851.

Frasera fastigiata Heller, Bull. Torrey Club 24: 312. 1897.

Stems usually solitary from the stout taproot, 6–10 dm. high, stout, hollow; herbage glabrous. Basal leaves oblanceolate to broadly spatulate, 20–40 cm. long, 5–8 cm. wide, obtuse or acute, thin, narrowed to a winged petiole; stem-leaves whorled, usually in threes, broadly lanceolate to oblong, sessile; inflorescence a many-flowered and rather crowded, much-compounded thyrsus or panicle; corolla-lobes pale blue, lanceolate to elliptic, 8–10 mm. long, acute; gland solitary, rounded, the margin conspicuously fimbriate; crown reduced to a low setuliferous membrane to which the stamens are attached; capsule elliptic, 6–12 mm. long, flattened; seeds compressed, about 4 mm. long, only slightly and unequally winged.

Open woods, Transition Zone; Spokane and Whitman Counties, eastern Washington, northern Idaho and the Blue Mountains, Oregon. Type locality: "in moist places on the Squamash [Quamash] Flats," according to Lewis' label on the original specimen. Quamash Flats is now Weippe, Idaho. May–July.

Swertia umpquaensis (Peck & Applegate) St. John, Amer. Midl. Nat. 26: 14. 1941. (*Frasera umpquaensis* Peck & Applegate, Madroño 6: 12. 1941.) Very similar to *Swertia fastigiata* in general habit, but petals rather abruptly narrowed at apex and ending in a slender apiculation usually with 1 or more minute teeth beneath the apiculation; setae on the margin of the petal-gland and also on the surface of the petal below the gland. Known only from Jackson County, Oregon. Type locality: near Anderson Camp, Rogue-Umpqua Divide, upper waters of Rogue River, northeastern Jackson County. Collected by Elmer I. Applegate 5930.

4. *Swertia albicaulis* (Griseb.) Kuntze. White-stemmed Swertia or Fräsera. Fig. 3814.

Frasera albicaulis Griseb. in Hook. Fl. Bor. Amer. 2: 66. 1838.

Swertia albicaulis Kuntze, Rev. Gen. Pl. 2: 430. 1891.

Stems 1 to several from the crown of a stout perennial root, erect, 2–5 dm. high; herbage puberulent throughout. Basal leaves spatulate-oblanceolate, 5–15 cm. long, and 5–15 mm. wide, obtuse or acutish, usually with a very narrow white margin; stem-leaves opposite, usually of 2 or 3 pairs, similar to the basal but not smaller and acute, those of the inflorescence reduced to bracts; inflorescence an interrupted thyrsus becoming crowded at apex; pedicels 3–8 mm. long; calyx-lobes 6–7 mm. long; corolla greenish yellow, the lobes oval-elliptic, 7–8 mm. long; gland oblong-conic fringed with setae that curve inward and interlace over the gland but

becoming shorter toward the apex of the gland; scales between the filaments obdeltoid to oblong or linear, deeply lacinate to entire; capsule ellipsoid-ovate, compressed, 8 mm. long; style slender; seeds not longitudinally grooved or ridged.

Open ground in dry or moist situations, Arid Transition Zone; northeastern Washington south through eastern Oregon to northeastern California, east to Idaho and western Montana. Type locality: "In the Mountain Vallies between Spokane and Kettle Falls [Washington], in moist soil." May-June.

This species is variable and recently several segregates have been proposed (St. John, Amer. Midl. Nat. 26: 16-22. 1941): *Swertia sierrae* St. John, type locality, about 2 miles north of Madeline, altitude 4,500 feet, Lassen County, California; *Swertia modocensis* St. John, type locality also about 2 miles north of Madeline, altitude 4,500 feet, Lassen County, California; *Swertia californica* St. John, type locality Camp Bidwell, Lassen County, California; *Swertia Bethelii* St. John, type locality, Fall River Mills, Shasta County, California. All of these resemble typical *Swertia albicaulis* in habit and major morphological characters and differ only in rather minute and apparently unstable characters, such as entire or variously toothed crown-scales and in the size and shape of the glands.

5. *Swertia nítida* (Benth.) Jepson. Shining *Swertia*. Fig. 3815.

Frasera nítida Benth. Pl. Hartw. 322. 1849.

Swertia nítida Jepson, Man. Fl. Pl. Calif. 766. 1925.

Frasera nítida var. *albida* Suksd. Werdenda 1: 30. 1927.

Swertia albicaulis var. *nítida* Jepson, Fl. Calif. 3: 94. 1939.

Swertia columbiana St. John, Amer. Midl. Nat. 26: 22. 1941.

Stems usually several, erect, 2-5 dm. high, the whole plant glabrous. Basal leaves linear-oblancoate, 10-20 cm. long, 4-15 mm. wide, rounded to acutish at apex, narrowly white-margined; stem-leaves of 2 or 3 pairs, linear; inflorescence an interrupted thyrsus; calyx-lobes 4-6 mm. long, lanceolate-subulate, white-margined; corolla-lobes ovate-elliptic, 6-8 mm. long, dull white tinged with violet; gland greenish, oblong, the setae along the margin turned inward and interlacing; filaments monadelphous at base by a low glabrous crown; anthers attached at the middle, 2 mm. long; scales between the stamens, oblong, laciniately or pectinately 3- to several-lobed at summit; capsule flattened, about 10 mm. long; seeds oblong, 7 mm. long, grooved longitudinally.

Open coniferous forests, Arid Transition Zone; Klickitat County, Washington, south through the Cascade and Siskiyou Mountains, Oregon, to the central Sierra Nevada (Eldorado County) and the North Coast Ranges (Lake County), California. Type-locality: Sierra Nevada. May-July.

Swertia nítida subsp. *Cusickii* (A. Gray) Abrams. (*Frasera Cusickii* A. Gray, Proc. Amer. Acad. 22, 310. 1887; *F. nítida* var. *Cusickii* Nels. & Macbr. Bot. Gaz. 61: 33. 1916; *Swertia Cusickii* St. John, Amer. Midl. Nat. 26: 25. 1941.) Similar to the typical species in general habit; scales between the petals broadly oval, larger, completely concealing the ovary, entire. Western Idaho and the mountains of northeastern Oregon as far south as northern Harney County. Type locality: "Hillsides of Grande Ronde Valley, N.E. Oregon."

6. *Swertia neglécta* (Hall) Jepson. Pine *Swertia*. Fig. 3816.

Frasera neglecta Hall, Bot. Gaz. 31: pl. 10. 1901

Swertia neglecta Jepson, Man. Fl. Pl. Calif. 766. 1925.

Stems 1 to several from the root crown, erect, 25-45 cm. high; herbage glabrous and pale green. Basal leaves narrowly oblanceolate to linear, 3-10 cm. long, acute or acutish, white-margined; stem-leaves opposite, even the lowest pair often floriferous; inflorescence an interrupted thyrsus, with short lanceolate acuminate bracts; pedicels 1-2 cm. long; calyx-lobes narrowly lanceolate, white-margined, 6-7 mm. long; corolla-lobes oblong-obovate, 8-10 mm. long, acute, greenish white, veined with purple; gland enclosed to the middle or a little more by the pocket, the free portion quadrate, conspicuously fringed all around by incurved lacinae; capsule short-ovoid, about 5 mm. long.

Dry flats and slopes, Arid Transition Zone; mainly on the desert slopes of the San Emidio, San Gabriel, and San Bernardino Mountains, southern California. Type locality: Swartout Canyon, San Gabriel Mountains. May-Aug.

7. *Swertia puberulénta* (Davidson) Jepson. Inyo *Swertia*. Fig. 3817.

Frasera puberulenta Davidson, Bull. S. Calif. Acad. 11: 77. pl. 1. 1912.

Swertia puberulenta Jepson, Fl. Calif. 3: 95. 1939.

Stem solitary from the taproot, stout, 2-30 cm. high, about 1 cm. thick; herbage puberulent. Leaves white-margined, the basal oblanceolate, 3-6 cm. long, obtuse at apex, rather abruptly narrowed below to a winged petiole; stem-leaves opposite, oblong, obtuse, sessile and often somewhat conduplicate; inflorescence an open panicle; calyx-lobes lanceolate-subulate, 6-8 mm. long; corolla-lobes about equaling the calyx, greenish white flecked with dark purple, obovate, abruptly short-acuminate, gland almost completely enclosed by the pocket, fringed at the opening; ovary flecked with dark purple; anthers 1.5 mm. long.

Open coniferous forests, Boreal Zones; southern Sierra Nevada, usually at an elevation of 9,000 feet or more, Mono and Inyo Counties, California; also in the White Mountains, California. Type locality: South Lake, Bishop Creek, Inyo County, California. July-Aug.

8. *Swertia Párryi* (Torr.) Kuntze. Parry's *Swertia*. Fig. 3818.

Frasera Parryi Torr. Pacific R. Rep. 4: 126. 1857.

Swertia Parryi Kuntze, Rev. Gen. Pl. 2: 430. 1891.

Stems usually solitary from the taproot, stout, 6-12 dm. high, and 1-2 cm. thick; herbage glabrous. Leaves white-margined, the basal lanceolate or oblanceolate, acute at apex, tapering at base to a winged petiole, 5-15 cm. long, stem-leaves lanceolate, sessile, becoming smaller,



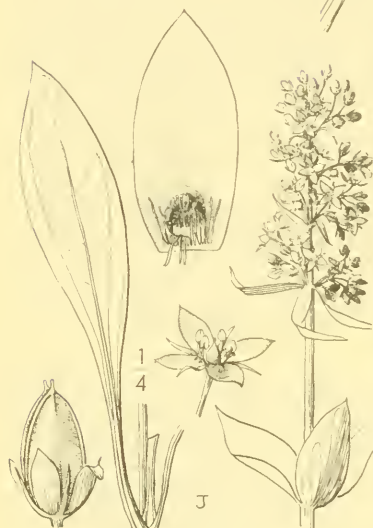
3811



3812



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3811. *Swertia perennis*
 3812. *Swertia radiata*
 3813. *Swertia fastigiata*

3814. *Swertia albicaulis*
 3815. *Swertia nitida*
 3816. *Swertia neglecta*

3817. *Swertia puberulenta*
 3818. *Swertia Parryi*
 3819. *Swertia albomarginata*

the upper often ovate-lanceolate; inflorescence a broad many-flowered panicle; calyx-lobes lanceolate 8–20 mm. long; corolla greenish white, flecked with black, the lobes about as long as the calyx; gland U-shaped, fringed all around, with a shallow pocket at base, crown-scales wanting; capsule long-conic, 12–16 mm. long; seeds wrinkled and conspicuously faveolate.

Open ground on benches and slopes, Upper Sonoran and Arid Transition Zones; San Gabriel Mountains, southern California, to the San Pedro Martir Mountains, Lower California, east to Arizona. Type locality: "mountains east of San Diego," California. April–July.

9. *Swertia albomarginata* (S. Wats.) Kuntze. Desert *Swertia*. Fig. 3819.

Fraseria albomarginata S. Wats. Bot. King. Expl. 280. 1871.

Swertia albomarginata Kuntze, Rev. Gen. Pl. 2: 431. 1891.

Leucocraspedum albomarginatum Rydb. Fl. Rocky Mts. 665, 1065. 1917.

Stems several or often solitary from a somewhat woody perennial taproot, 2–6 dm. high; herbage glabrous throughout. Leaves pale green, conspicuously white-margined, coriaceous, the basal oblanceolate, about 1 cm. wide, narrowed to a winged petiole, stem-leaves in whorls of 3 or 4, smaller, linear, somewhat conduplicate at base; inflorescence a broad corymbose panicle; bracts usually opposite, the upper much-reduced; calyx-lobes linear-subulate, 3–4 mm. long; corolla-lobes ovate-acuminate, 8–10 mm. long, greenish yellow, veined and often flecked with purple; gland linear, shallowly 2-lobed at apex, rather sparsely fimbriate; crown wanting; capsule 7–10 mm. long, flattened contrary to the valves; seeds oblong, 3–4 mm. long, not winged.

Dry desert slopes, Upper Sonoran Zone; Providence Mountains, southern California, eastward through southern Nevada and northern Arizona to southern Utah and southwestern Colorado. Type locality: near St. George, southern Utah. June–Aug.

10. *Swertia tubulosa* Coville. Kern *Swertia*. Fig. 3820.

Fraseria tubulosa Coville, Proc. Biol. Soc. Wash. 7: 71. 1892.

Swertia tubulosa Jepson, Man. Fl. Pl. Calif. 767. 1925.

Stems solitary or few from the somewhat woody root, 25–60 cm. high; herbage glabrous and glaucous. Leaves conspicuously white-margined, the basal rather numerous, spatulate, 4–9 cm. long, 1–1.5 cm. wide, narrowed to an elongated winged petiole, recurved and mucronate at apex, the stem-leaves in whorls of 5 or 6, conduplicate at base; inflorescence a narrow spicate panicle, more or less interrupted below; pedicels 2–20 mm. long; calyx-lobes linear-subulate, 6–8 mm. long; corolla-lobes white, oblong-obovate, acuminate, a little exceeding the calyx; gland none; crown forming a deeply 2-lobed tube, lacinate at the apex, the anterior lobe shorter and both lobes lacerate-fimbriate; capsule elliptic, strongly flattened, 7–9 mm. long; seeds 1 or 2, flattened, 5–7 mm. long, cellular-muriculate.

Open pine forests, Canadian Zone; basin of the Upper Kern River, from Farewell Gap to Olancho Mountain, southern Sierra Nevada, Tulare County, California. Type locality: under *Pinus jeffreyi*, Soda Springs, on the north fork of Kern River, California. June–Aug.

Family 122. MENYANTHACEAE.

BUCKBEAN FAMILY.

Perennial aquatic or marsh herbs, from perennial rootstocks. Leaves basal or alternate, entire, crenate or trifoliate. Flowers clustered, regular, often heterogamous. Calyx deeply 5-parted or 5-lobed, persistent, free from the ovary or the tube adnate to the lower portion. Corolla funnelform or rotate, 5-lobed or 5-parted, the lobes induplicate-valvate in the bud. Stamens 5, borne on the corolla-tube, alternate with the lobes; filaments usually short; anthers longitudinally dehiscent, in ours sagittate; pollen 3-angled. Ovary superior, 1-celled, the two parietal placentae sometimes intruded; style present or sometimes none. Fruit a capsule or indehiscent. Seed-coat crustaceous, smooth and shining.

A small family of 5 genera and about 35 species of wide geographical distribution.

Leaves trifoliate, the leaflets entire; flowers in a simple raceme.

1. *Menyanthes*.

Leaves simple, reniform, crenate; flowers in a simple or compound cyme.

2. *Nephrophyllidium*.

1. *MENYANTHES* [Tourn.] L. Sp. Pl. 145. 1753.

A perennial glabrous marsh herb, with creeping rootstocks and glabrous herbage. Leaves alternate, basal, with long petioles and 3-foliate blades. Flowers white or purplish, racemose, or paniced on long lateral scapes or peduncles. Calyx 5-parted into oblong or lanceolate segments. Corolla short-funnelform, the lobes spreading, fimbriate or bearded on the inner surface. Filaments filiform; anthers sagittate. Disk of 5 hypogynous glands. Ovary 1-celled; style subulate, persistent; stigma 2-lamellate. Fruit an

ovoid capsule, indehiscent or tardily rupturing. Seeds few, compressed-globose, shining. [Name Greek meaning month and flower, perhaps in reference to the length of the blooming period.]

A monotypic genus inhabiting the cooler parts of the northern hemisphere.

1. *Menyanthes trifoliata* L. Buckbean. Fig. 3821.

Menyanthes trifoliata L. Sp. Pl. 145. 1753.

Rootstocks thick, clothed with membranous sheathing bases of old petioles. Leaves 3-foliate, the leaflets oblong or obovate, narrowed to the sessile base, 2-6 cm. long, entire, pinnate-veined; petioles 3-20 cm. long, stout, sheathing at base; raceme borne on a long naked peduncle arising from the rootstock, 7-20-flowered; pedicels stout, 5-25 mm. long, bracteate at base; calyx-lobes ovate-lanceolate, 3-5 mm. long; corolla white or tinged with purple, the tube a little longer than the calyx, the lobes spreading about 5 mm. long, bearded within with white hairs; anthers scarcely exerted and the style well-exserted, or anthers well-exserted and the style shorter; capsule ovoid, obtuse at apex, about 8 mm. long.

Growing in bogs and margins of small lakes, Boreal and Transition Zones; Alaska to Greenland south to California, Colorado, Indiana, and Pennsylvania; also Europe and Asia. In the Pacific States, it occurs in the Cascade Mountains of Washington and Oregon and on the Pacific Slope from the Puget Sound to western Oregon; in California it occurs in the Sierra Nevada as far south as Tulare County. Type locality: Europe. May-Aug.

2. *NEPHROPHYLLIDIUM* Gilg. in Engl. & Prantl. Nat. Pflanzenf. 4²:105. 1895.

Glabrous herb with stout creeping perennial rootstock inhabiting bogs and wet meadows. Leaves basal, with reniform crenate blades and elongated petioles expanding at base into a broad membranous sheath. Flowers in a simple or compound cyme terminating inflexed scape, the pedicels subtended by a bract. Calyx 5-lobed, the tube adnate to the ovary, obconic, the lobes persistent. Corolla white, 5-lobed, the tube short, the lobes spreading, with an undulating crest along the median nerve. Stamens 5, filaments filiform; anthers sagittate. Ovary partly inferior, 1-celled with 2 parietal placentae; style short; stigma discoid, obscurely 2-lobed. Capsule semi-inferior, the free portion narrowly conic, splitting into 4 teeth or lobes at apex. Seeds ellipsoid, flattened, light colored and shining. [Name Greek, meaning like *Nephrophyllum*, a genus of the Convolvulaceae with kidney-shaped leaves.]

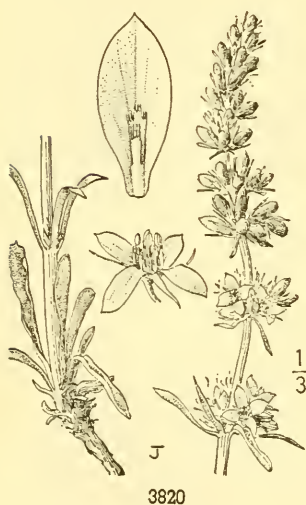
A monotypic genus of northwestern North America and Japan.

1. *Nephrophyllidium Crista-galli* (Menzies) Gilg. Deer Cabbage. Fig. 3822.

Menyanthes Crista-galli Menzies ex Hook. Bot. Misc. 1: 45. pl. 24. 1830.

Nephrophyllidium Crista-galli Gilg. in Eng. & Prantl. Nat. Pflanzenf. 4²: 106. 1895.

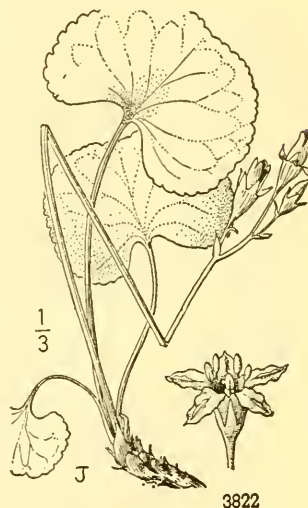
Rootstocks stout, creeping covered with the broad membranous bases of the old petioles. Leaves all basal, the blades reniform, sometimes broadly emarginate, crenate, 3-10 cm. broad;



3820. *Swertia tubulosa*



3821. *Menyanthes trifoliata*



3822. *Nephrophyllidium Crista-galli*

petioles stout, 4–15 cm. long; scapes 15–60 cm. high, bearing a terminal simple or 1–2-forked cyme; bracts lanceolate to linear-lanceolate, 5–15 mm. long; pedicels 3–10 mm. long; calyx-tube conic to turbinate, 4–6 mm. long; the lobes lanceolate, 4 mm. long; corolla white, the tube scarcely equaling the calyx-lobes, the lobes spreading, 5–6 mm. long, oblong-ovate, crisped on the margin and bearing a low undulating crest along the median nerve on the upper surface; capsule with the lower half adnate to the calyx-tube, the free portion narrowly conic, splitting at the apex into 2 lobes each lobe more or less 2-toothed.

Wet places, especially sphagnum bogs, Boreal Zones; Alaska to British Columbia, Vancouver Island and northwestern Washington, where it has been collected in Grays Harbor County. Type locality: "in marshy mountain pastures in Prince William's Sound." June–Aug.

Family 123. APOCYNACEAE.

DOGBANE FAMILY.

Perennial herbs, vines or shrubs, or some tropical species trees, mostly with an acrid milky juice. Leaves opposite, verticillate, or sometimes alternate, without stipules. Flowers regular, perfect, solitary in the axils, or cymose or paniculate. Calyx free from the ovary, persistent, 5-parted, the lobes imbricate in the bud. Corolla sympetalous, lobes 5, convolute and often twisted in the bud. Stamens 5, alternating with the corolla-lobes and inserted on the corolla-tube or -throat; anther linear-oblong or sagittate. Ovary superior or the base adherent to the calyx, bicarpellate, the carpels distinct or united and forming a 1-celled ovary with 2 parietal placentae, or 2-celled; styles simple or 2-divided; stigma simple. Fruit follicular or drupaceous. Seeds often appendaged with a conspicuous coma; endosperm fleshy; embryo straight.

A family of about 150 genera and over 1,000 species, of wide geographical distribution, but most abundant in tropical regions.

Stamens attached to the summit of the corolla-tube; anthers free from the stigma; seeds without coma.

Leaves alternate; erect herbs; flowers cymose.

1. *Amsonia*.

Leaves opposite; trailing vines; flowers solitary in the axils.

2. *Vinca*.

Stamens attached to the base of the corolla-tube; anther-cells produced into an elongate appendage at base, connivent around the stigma and adnate to it at the base of the pollen-sacs; seeds with a conspicuous coma.

Corolla-tube with 5 minute appendages alternating with the stamens; the lobes convolute in bud.

3. *Apocynum*.

Corolla-tube with a minute appendage behind each stamen; the lobes not convolute in bud.

4. *Cycladenia*.

1. AMSONIA Walt. Fl. Car. 98. 1788.

Perennial herbs, with alternate leaves, and bluish flowers in terminal thyrsoid or corymbose cymes. Calyx 5-parted into narrow acuminate segments. Corolla 5-lobed, salverform, the tube cylindric, villous within. Stamens included, inserted on the throat of the corolla; anthers ovate or oblong. Disk none. Ovary of 2 carpels, connected at the summit by the single filiform style; ovules in 2 rows in each carpel, numerous; stigma appendaged by a reflexed membrane, apiculate with 2 distinct lobes or entire and depressed-capitate or truncate. Fruit of 2 cylindric or somewhat torulose, several-seeded follicles. Seeds cylindric or oblong, without coma. [Name in honor of Dr. Amson, a Virginia physician, and friend of Clayton, who first proposed the name.]

A genus of about 17 species, inhabiting North America and Japan. Type species, *Amsonia Tabernaemontana* Walt.

Plants glabrous; seeds truncate, at least at one end.

1. *A. brevifolia*.

Plants villous-tomentose; seeds sharply tapering at both ends.

2. *A. tomentosa*.

1. *Amsonia brevifolia* A. Gray. Short-leaved Amsonia. Fig. 3823.

Amsonia brevifolia A. Gray, Proc. Amer. Acad. 12: 64. 1876.

Stems usually several from the woody base, 25–35 cm. high, simple or usually branching above, the branches ascending, herbage glabrous throughout. Leaves lanceolate to ovate, acuminate at apex, 2–4 cm. long, 0.5–20 mm. wide, rather abruptly narrowed at base to a short petiole; calyx-lobes subulate, 3–4 mm. long, the margins scarious; corolla white and greenish yellow within, the tube purplish without, 8–10 mm. long, constricted at the throat, the lobes 4–5 mm. long; follicles 3–9 cm. long, somewhat constricted between the seeds, these about 10 mm. long, more or less obliquely truncate at both ends.

Dry benches and flats, Lower Sonoran Zone; Mojave Desert in Inyo and San Bernardino Counties south to the northern rim of the Colorado Desert, in the Chuckwalla and Eagle Mountains, California; east to Nevada, Utah, and northern Arizona. Type locality: "S. Utah and W. Arizona, to the border of California, Mrs. Thompson, Dr. Parry, Dr. Palmer." April–June.

2. *Amsonia tomentosa* Torr. & Frem. Woolly Amsonia. Fig. 3824.

Amsonia tomentosa Torr. & Frem. Second Rep. 316. 1845.

Amsonia brevifolia var. *tomentosa* Jepson, Man. Fl. Pl. Calif. 768. 1925.

Stems several from the woody base, 25–35 cm. high, simple or branched above, herbage hoary-tomentose throughout including the calyx. Leaves lanceolate to ovate, acute to acuminate, 2–5 cm. long, short-petioled; calyx-lobes 4–6 mm. long, very slender and weak; corolla whitish, turning bluish in age, the tube clavate, constricted at the summit, about 10 mm. long, the lobes oblong-ovate, 5 mm. long, 7-nerved; follicles 3–6 cm. long, more or less torulose; seeds usually pointed at both ends.

Rocky slopes and bajadas, Lower Sonoran Zone; base of the San Bernardino Mountains, Mojave Desert, and northern Colorado Desert, California to Nevada, Arizona, and southern Utah. Type locality: "probably west of the Rocky Mts." April–June.

2. *VINCA* L. Sp. Pl. 209. 1753.

Erect or trailing herbs, or some species slightly woody, with opposite entire leaves, and large flowers solitary in the axils. Calyx 5-parted, the segments narrow, acuminate. Corolla salverform, the lobes oblique, convolute in bud, the tube pubescent within, the throat constricted. Stamens 5, alternate with the lobes included. Disk of 2 large glands alternating with the 2 carpels. Ovules several in each carpel; style simple, filiform; stigma annular and penicillate at apex. Follicles 2, cylindric, erect or spreading, several-seeded. Seeds oblong-cylindric, truncate at each end, without coma. [The ancient Latin name.]

An Old World genus of about 12 species. Type species, *Vinca major* L.

1. *Vinca major* L. Periwinkle. Fig. 3825.

Vinca major L. Sp. Pl. 209. 1753.

Trailing slightly woody vines, rooting freely, the flowering stems or branches erect, 2–3 dm. high. Leaves bright green and glabrous, ovate, cordate at base, obtuse or acute at apex, 2–3 cm. long; petioles 5–20 mm. long, often ciliolate; pedicels slender, 3–5 cm. long; calyx-lobes subulate, about 1 cm. long; corolla blue or violet, the tube 15–20 mm. long, the lobes as long as the tube or longer and nearly as broad at the obliquely subtruncate apex; follicles cylindric, somewhat torulose, 4 cm. or more in length.

Shaded or partly shaded places, Upper Sonoran and Transition Zones; escaped from cultivation and becoming naturalized in many localities in the Pacific States. Native of the Mediterranean Region. Often but erroneously called myrtle. March–July.

3. *APÓCYNUM* L. Sp. Pl. 213. 1753.

Perennial herbs with opposite entire leaves and corymbose cymes of small white or pink flowers. Calyx 5-parted, the segments lanceolate, acute. Corolla urceolate to campanulate, 5-lobed, the tube bearing 5 small appendages alternate with the stamens. Stamens borne on the base of the corolla-tube; anthers sagittate, connivent around the stigma and slightly adherent to it. Disk present, 5-lobed. Ovary of 2 carpels, each bearing numerous ovules; stigma ovoid, obtuse, obscurely lobed. Fruit of 2 slender elongated terete follicles. Seeds numerous, small, tipped with a long conspicuous coma. [Greek, meaning dogbane.]

As delimited by Woodson (Ann. Mo. Bot. Gard. 17: 1–172. 1930.) *Apocynum* is a North American genus of 7 species. Type species, *Apocynum cannabinum* L.

Corolla barely exceeding the calyx, the lobes erect; leaves ascending.

Corolla spherico-cylindric, about as broad as long; leaves distinctly petioled; coma of seeds 20–30 mm. long.

1. *A. cannabinum*.

Corolla tubular-cylindric, distinctly longer than broad; leaves sessile or essentially so, the lower often amplexicaul; coma of seeds 15–20 mm. long.

2. *A. sibericum salignum*.

Corolla at least twice the length of the calyx, campanulate or cylindric, the lobes spreading or recurved.

Leaves spreading; corolla cylindric, 4–5 mm. long.

3. *A. medium floribundum*.

Leaves drooping; corolla campanulate or cylindric, at least 3 times as long as the calyx.

Corolla campanulate, 5–10 mm. long; cymes rarely axillary as well as terminal; pods pendulous.

4. *A. androsaemifolium*.

Corolla cylindric, 4–6 mm. long; cymes usually axillary as well as terminal; pods erect.

5. *A. pumilum*.

1. *Apocynum cannabinum* L. Common Dogbane or Indian Hemp. Fig. 3826.

Apocynum cannabinum L. Sp. Pl. 213. 1753.

Apocynum cannabinum var. *glaberrimum* A. DC. Prod. 8: 439. 1844.

Apocynum Bolanderi Greene, Leaflets Bot. Obs. 2: 175. 1912.

Stems erect or ascending, 3–6 dm. high, branched above, the branches ascending often opposite, herbage glabrous throughout. Leaves ascending, distinctly petioled, ovate to lanceolate or oblong-lanceolate, acute to rounded at both ends, conspicuously apiculate at apex, 4–12 cm. long, 1–4 cm. wide, pale beneath; cymes terminal; bracts minute, scarious; calyx-lobes scarious,

glabrous, 1.5–2 mm. long; corolla 2–3 mm. long and nearly as broad, the lobes erect; follicles pendulous, slightly falcate, 8–15 cm. long, slender; seeds 4–5 mm. long, their coma 2–3 cm. long.

Usually in partial shade or moist places, Upper Sonoran and Transition Zones; Washington to southern California, east to Quebec, Pennsylvania, and Florida. Type locality: "Canada, Virginia." June–Sept.

Apocynum cannabinum var. *pubescens* (Mitchell) A. DC. Prod. 8: 440. 1844. (*Apocynum pubescens* Mitchell ex. R. Br. Mem. Wern. Soc. 1: 63. 1809.) General habit of the preceding, but the inflorescence and both surfaces of the leaves pubescent or somewhat tomentose. The variety has about the same wide range as the typical species, but is much less common in the Pacific States, where it has been collected on the edges of sloughs and marshes in Butte, Humboldt, and Solano Counties, California. Type locality: Virginia.

2. *Apocynum sibiricum* var. *salignum* (Greene) Fernald. Claspingleaved Dogbane. Fig. 3827.

Apocynum salignum Greene, Pittonia 5: 64. 1902.

Apocynum nevadense Goodding, Bot. Gaz. 37: 57. 1904.

Apocynum densiflorum, A. Brewer, A. thermale, A. longifolium Greene, Leaflets Bot. Obs. 2: 176–177. 1912.

Apocynum hypericifolium var. *salignum* Bég. & Bel. Atti R. Accad. Lincei V. 9: 118. 1913.

Apocynum sibiricum var. *salignum* Fernald, Rhodora 37: 328. 1935.

Stems erect or slightly decumbent at base, 2–6 dm. high, branches opposite or nearly so, herbage glabrous throughout. Leaves nearly or quite sessile and the lower often amplexicaul, 4–10 cm. long, oblong to oblong-lanceolate, acute or obtuse at apex, obtuse, subcordate or rarely acute at base, pale green beneath and often nearly as pale above, usually mucronate at apex; cymes terminal, the bracts subulate, herbaceous; calyx-lobes 1.5–2 mm. long; corolla short-cylindric, longer than broad, 3 mm. long, the lobes erect; follicles 6–15 cm. long; seeds 3.5–4 mm. long, the coma 15–20 mm. long.

Usually in moist places, Upper Sonoran and Transition Zones; British Columbia, eastern Washington and Oregon, to southern California, east to Manitoba, Minnesota, and Texas. Type locality: Humboldt County, California. June–Aug.

Apocynum Suksdorfii Greene, Pittonia 5: 65. 1902. (*Apocynum oliganthum* Greene, Leaflets Bot. Obs. 1: 58. 1904; *A. cannabinum* var. *oliganthum* Bég. & Bel. Atti R. Accad. Lincei V. 9: 104. 1913; *A. cannabinum* var. *Suksdorfii* Bég. & Bel. op. cit. 105.) The plants that have been referred to these proposed species were all considered conspecific with *A. Suksdorfii* by Woodson (Ann. Mo. Bot. Gard. 17: 117. 1930). There seems to be no essential difference between them and *A. sibiricum* var. *salignum*. They have the tubular-cylindric corolla 2–3 mm. long including the erect lobes, and the distribution is essentially the same. Type locality: banks of the Columbia River.

3. *Apocynum medium* var. *floribundum* (Greene) Woodson. Western Dogbane. Fig. 3828.

Apocynum floribundum Greene, Erythea 1: 151. 1893.

Apocynum viarum Heller, Muhlenbergia 2: 110. 1906.

Apocynum vacillans Greene, Leaflets Bot. Obs. 2: 180. 1912.

Apocynum rubicundum Greene, op. cit. 182.

Apocynum medium var. *floribundum* Woodson, Ann. Mo. Bot. Gard. 17: 113. 1930.

Apocynum cannabinum var. *floribundum* Jepson, Fl. Calif. 3: 103. 1939.

Plants glabrous throughout, the stems 2–5 dm. high, freely and more or less dichotomously branched, the branches ascending. Leaves spreading, petioled or subsessile, ovate to lanceolate, acute to obtuse at both the apex and base, or sometimes cordate; cymes terminal or sometimes borne in the axils of the next to last pair of leaves; calyx-lobes 1.5–3 mm. long; corolla cylindric, 4–5 mm. long, the lobes somewhat spreading, and slightly recurved follicles reflexed, straight, 7–15 cm. long; seeds cylindric, 4 mm. long.

Dry slopes or borders of meadows, Upper Sonoran and Transition Zones; Washington to southern California, east to Montana, New Mexico and Texas; also in Chihuahua, according to Woodson. Type locality: "Dry ground bordering pine woods, in the higher mountains west of the Mohave Desert," in Kern County, California. June–Aug.

Apocynum medium var. *vestitum* (Greene) Woodson, Ann. Mo. Bot. Gard. 17: 116. 1930. (*A. vestitum* Greene, Man. Bay Reg. 240. 1894; *A. incanum* Greene, Leaflets Bot. Obs. 2: 164. 1911.) Like the preceding species except the entire herbage is pubescent, even to the calyx. Rogue River, Oregon, to Napa County, California. Type locality: "Hills west of Napa Valley, in dry soil," California. The typical species has flowers comparatively broader-campanulate, and leaves, at least the upper surface, tomentose or sometimes glabrate. It ranges from Nebraska and Texas to the Atlantic Coast.

4. *Apocynum androsaemifolium* L. Spreading Dogbane. Fig. 3829.

Apocynum androsaemifolium L. Sp. Pl. 213. 1753; ed. 2. 311. 1762.

Apocynum ambigens Greene, Pl. Baker. 3: 17. 1901.

Apocynum scopulorum Greene ex Rydb. Fl. Colo. 269. 1906.

Apocynum macranthum Rydb. Fl. Rocky Mts. 669. 1917.

Stems erect or ascending, 2–5 dm. high, freely and somewhat dichotomously branching, the branches ascending, alternate or subalternate, glabrous. Leaves opposite, drooping, distinctly petioled, ovate to oblong-lanceolate, obtuse or rounded at base, acute and mucronate at apex, 3–9 cm. long, glabrous or essentially so; cymes open; calyx-lobes scarious, 1–2 mm. long, sometimes colored, glabrous; corolla pinkish, campanulate, 5–8 mm. long, the lobes reflexed; follicles pendulous, straight, 6–15 cm. long; seed ovoid, 1 mm. long; coma pale tawny, 15–20 mm. long.

Open coniferous forests, Transition Zone; British Columbia south to southern California east to Anticosti and Georgia. Type locality: "Habitat in Virginia, Canada." June–Aug.

Apocynum androsaemifolium var. *incanum* A. DC. Prod. 8: 439. 1844. Essentially the same as the typical species except that the leaves are pubescent or tomentose beneath. The same general range as the species, and so far as the plants in the Pacific States are concerned scarcely worthy of taxonomic recognition. Type locality: not given.

5. *Apocynum pumilum* (A. Gray) Greene. Mountain Dogbane. Fig. 3830.

Apocynum androsaemifolium var. *pumilum* A. Gray, Syn. Fl. N. Amer. ed. 2 2¹: 83. 1886.

Apocynum pumilum Greene, Man. Bay Reg. 240. 1894.

Apocynum calophyllum Greene, Leaflets Bot. Obs. 1: 57. 1904.

Apocynum cardiophyllum Greene, op. cit. 79.

Apocynum bicolor McGregor, Bull. Torrey Club 37: 261. 1910.

Apocynum ovalifolium, *A. paniculatum*, *A. stenolobum*, *A. eximium*, *A. xylosteaceum*, *A. rotundifolium*, *A. Austiniae*, *A. cercidium*, *A. luridum* Greene, Leaflets Bot. Obs. 2: 182-189. 1912.

Stems often branching from near the ground, seldom over 1 dm. above, the branches somewhat dichotomous, spreading or ascending, whole plant not over 4 dm. high, glabrous throughout. Leaves spreading or drooping, opposite, distinctly petioled, broadly ovate to oblong-lanceolate, obtuse to subcordate at base, obtuse to acutish and usually mucronate at apex, 1.5-5 cm. long; cymes terminal and also often from the axils of the uppermost two or three pairs of leaves; calyx-lobes triangular-lanceolate, to oblong-ovate, 1-1.5 mm. long, more or less colored; corolla 4-6 mm. long; tinged with pink, the tube cylindric, the lobes recurved at least in age; follicles erect, divergent, 5-15 cm. long, straight; coma of seed tawny or white; seed narrowly ovoid, 1.5-2 mm. long.

Open coniferous forests and dry flats, Upper Sonoran and Arid Transition Zones; mainly east of the Cascade Mountains in Washington and Oregon, ranging from Kittitas and Whitman Counties, Washington, to Klamath County, Oregon; in southern Oregon extending westward in the Siskiyou region to Josephine County, Oregon, and southward in the North Coast Ranges to Mendocino County, and in the Sierra Nevada to the San Bernardino Mountains, California; east to Idaho, Montana, Wyoming, Nevada, and Utah. Type locality: "California, to Brit. Columbia." No definite locality or specimen cited. June-Aug.

Apocynum pumilum var. *rhomboideum* (Greene) Bég. & Bel. Atti R. Accad. Lincei V, 9: 98. 1913. (*A. rhomboideum* Greene, Pittonia 5: 66. 1902; *A. androsaemifolium detonsum* Piper, Contr. U.S. Nat. Herb. 11: 453. 1906; *A. cinereum* Heller, Muhlenbergia 8: 21. 1912; *A. polycardium*, *A. pulchellum*, *A. arcuatum*, *A. diversifolium* Greene, Leaflets Bot. Obs. 2: 184-189. 1912.) Plant variously tomentose or pubescent, otherwise very similar to the typical species. Olympic Mountains and Puget Sound, Washington, to southern California, east to northern Idaho and western Nevada. Type locality: Napa Valley, California, "east of the village of St. Helena."

4. *CYCLADENIA* Benth. Pl. Hartw. 322. 1849.

Low herbs with a stout fleshy deep-seated perennial root and 1 to several short erect stems. Leaves opposite, the lower reduced to bracts, the upper 3-4 pairs with broad entire blades, petioled. Peduncles axillary, bearing 2-5 pedicellate flowers. Calyx 5-parted, the segments subulate. Corolla rose-purple, funnelform, 5-lobed, the lobes ovate-oblong, contorted in bud, the tube bearing 5 minute appendages alternate with the lobes. Stamens 5, alternate with the lobes, attached to the tube near the base; anthers sagittate, connivent. Disk annular, entire. Ovary with 2 distinct carpels; style short with a conspicuous membranous collar, slender; stigma broad, 5-angled; ovules many. Fruit of 2 slightly fleshy follicles. Seeds narrowly urn-shaped, compressed; coma copious, slightly tawny. [Name Greek, meaning circle and gland, in reference to the disk.]

A monotypic genus of California except for one variety which is also found in Utah.

1. *Cycladenia humilis* Benth. Cycladenia. Fig. 3831.

Cycladenia humilis Benth. Pl. Hartw. 323. 1849.

Stems 1 to several from a deep-seated fleshy root, somewhat succulent, 1-2 dm. high, simple or with one or two short branches, herbage glabrous throughout. Leaves of the subterranean part of the stem reduced to broad bracts, the upper of 2-3 pairs with broadly ovate or sub-orbicular blades, 2.5-6 cm. long, rounded to obtuse at apex, abruptly narrowed or subcordate at base; petioles broad, about equaling or shorter than the blades; flowers in axillary loosely branched cymes; pedicels slender, 1-2 cm. long, subtended by small subulate bracts; calyx-lobes narrowly lanceolate, 4-6 mm. long, glabrous; corolla rose-purple, about 15 mm. high, glabrous, the lobes about 6 mm. long and about as broad, broadly ovate, rounded or subtruncate at apex; follicles erect, 4-6 cm. long; seed compressed, oblong-urceolate, 5-6 mm. long, reddish brown; coma slightly tawny, about 20 mm. long.

Rocky ridges and slopes. Arid Transition Zone; Modoc Lava Beds and Black Butte, Siskiyou County to Lake and Butte Counties, California. Type locality: collected by Hartweg "In montibus Sacramento," probably in Butte County. May-July.

Cycladenia humilis var. *tomentosa* A. Gray, Syn. Fl. N. Amer. ed. 2, 2¹: 400. 1886. (*Cycladenia tomentosa* A. Gray, Bot. Calif. 1: 474. 1876.) Herbage densely tomentose-pubescent; calyx short-hirsute; corolla glabrous on the outer surface, otherwise as in the typical species. Approximately the same range as the species and often associated with it. Probably best considered a pubescent form. It has been shown that in *Apocynum* seeds from the same plant will give rise to both pubescent and glabrous plants. Type locality: Plumas County, California.

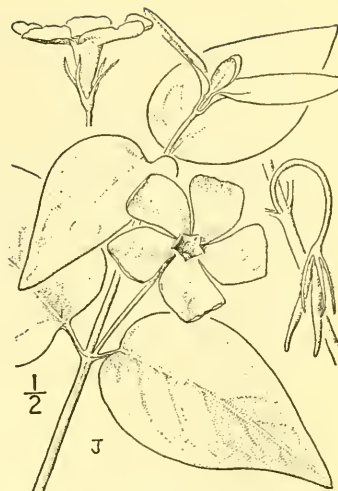
Cycladenia humilis var. *venusta* (Eastw.) Woodson ex Munz, Man. S. Calif. 379. 1935. (*Cycladenia venusta* Eastw. Bull. Torrey Club 29: 77. 1902.) Corolla-tube and calyx villous-hirsute externally and a little larger than in the typical species; vegetative parts apparently always glabrous. Santa Lucia Peak, Santa Lucia Mountains, Monterey County, eastern San Gabriel Mountains, southern California, and San Rafael Swell, Utah. Type locality: Santa Lucia Peak, California.



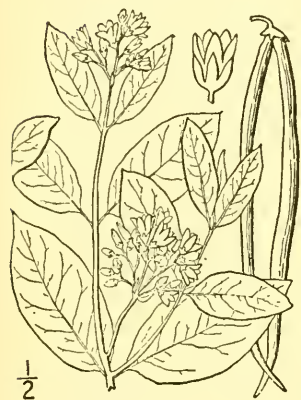
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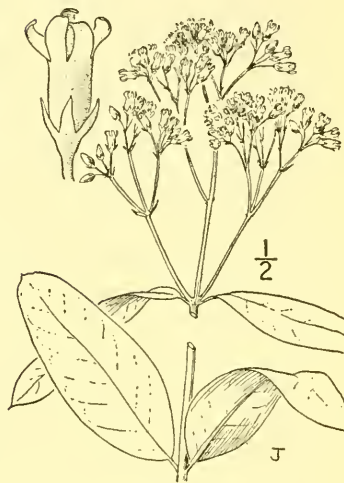
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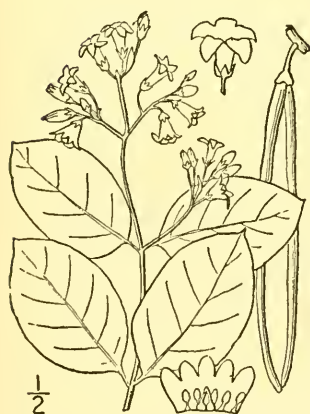
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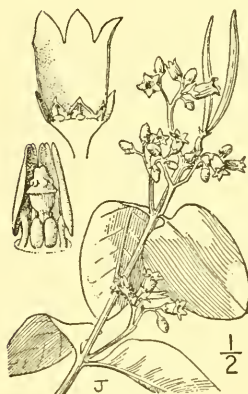
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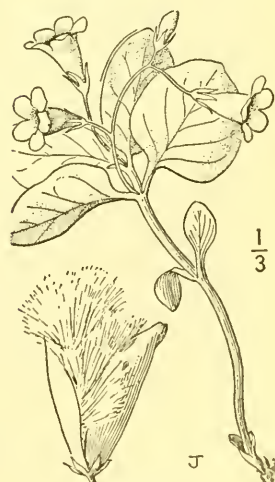
3828



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3831

3823. *Amsonia brevifolia*
3824. *Amsonia tomentosa*
3825. *Vinca major*

3826. *Apocynum cannabinum*
3827. *Apocynum sibiricum*
3828. *Apocynum medium*

3829. *Apocynum androsaemifolium*
3830. *Apocynum pumilum*
3831. *Cycladenia humilis*

Family 124. ASCLEPIADACEAE.

MILKWEED FAMILY.

Perennial herbs, vines or shrubs, usually with milky juice. Leaves opposite, alternate or verticillate, without stipules. Flowers mostly umbellate, perfect and regular, commonly 5-merous. Calyx free from the ovary, 5-parted or 5-lobed, the segments usually imbricated. Corolla 5-lobed to 5-cleft, varying from funnellform to rotate, the lobes commonly valvate in the bud. Crown present, situated just outside the stamens and adnate to them or to the corolla, 5-lobed or 5-parted. Stamens 5, inserted on the corolla-tube, usually near the base, distinct or commonly monadelphous; anthers basifixed, connivent around the stigma, introrsely 2-celled, the sacs appendaged or tipped with a scarious, erect or inflexed appendage, sometimes appendaged at base; pollen coherent into glandular or granular masses, one or rarely two of these masses in each pollen-sac, and connected with the stigmas in pairs or rarely in fours by 5 glandular corpuscles alternate with the anthers. Ovary bicarpellate; styles 2, connected at the apex by the peltate discoid stigma; ovules numerous, pendulous, mostly anatropous. Fruit a pair of several- to many-seeded follicles. Seeds compressed, usually appendaged by a conspicuous coma; endosperm cartilaginous, usually scanty; embryo generally large; cotyledons flat.

About 250 genera and over 2,000 species, of wide geographical distribution, most abundant in tropical and warm temperate regions.

Stems twining.

Crown wanting; corolla-lobes cucullate; flowers in umbels.

1. *Astephanus*.

Crown present; corolla-lobes plane.

Flowers in umbels; crown double, the outer a mere ring, the inner of 5 fleshy hood-like scales; pollen-masses pendulous to the caudicle.

2. *Funastrum*.

Flowers solitary in the axils; crown single, of 5 thin white scales; pollen-masses horizontal to the caudicle.

3. *Gonolobus*.

Stems not climbing.

Corolla-lobes reflexed in anthesis; hoods distinct from each other.

Stems flattened, prostrate; anther-wings lunate; hoods slit down the back into 2 valves; horns none.

4. *Solanoa*.

Stems terete, erect or decumbent; anther-wings broadened at the base and angled on the back; hoods variously slit; horns present (except *A. cordifolia* and *californica*).

5. *Asclepias*.

Corolla-lobes erect-spreading in anthesis; hoods united to each other by a lobed disk.

6. *Asclepiodora*.

1. ASTÉPHANUS R. Br. Mem. Wern. Soc. 1: 54. 1809.

Shrubs or suffrutescent plants, the stems often slender and twining. Leaves opposite, slender or reduced to spines. Flowers small, in few-flowered cymes or umbellate, sessile in the axils or pedunculate. Calyx 5-parted, the segments acute. Corolla urceolate or nearly campanulate, 5-lobed. Crown wanting. Stamens inserted on the base of the corolla-tube; anthers with a short inflexed appendage at apex; pollen-masses solitary in each pollen-sac, pendulous. Stigma obtusely conic or rostrate at apex. Follicles terete, acuminate, smooth. [Name Greek, meaning without crown.]

A genus of about 25 species, inhabiting southern Africa, Madagascar, South America, Cuba, Mexico, and the following species in southwestern United States. Type species, *Astephanus triflorum* (L. f.) R. Br.

1. *Astephanus utahensis* Engelm. Utah *Astephanus* or *Deboltia*. Fig. 3832.

Astephanus utahensis Engelm. Amer. Nat. 9: 349. 1875.

Astephanus filifolium Engelm. ex Benth. & Hook. Gen. Pl. 2: 747. 1876.

Cynanchum utahense Woodson, Ann. Mo. Bot. Gard. 28: 215. 1941.

Stems numerous arising from the subterranean woody branches of the taproot, very slender, spreading or twining, 25-50 cm. long, herbage pale gray-green, glabrous or sparsely puberulent. Leaves narrowly linear, 1-3 cm. long, 0.5-1.5 mm. wide, spreading or reflexed; umbels peduncled, few- to many-flowered, subtended by a few subulate bracts; rays 4-8 mm. long; calyx-lobes narrowly lanceolate, 1.5 mm. long, strigose; corolla yellowish, short-campanulate, 2-2.5 mm. long, the lobes cucullate with the apex strongly curved inward, papillose-puberulent within; anthers unappendaged at apex; follicles long-acuminate, seeds rough-granulate.

Sandy soils, Lower Sonoran Zone; Mojave and Colorado Deserts, California, to Nevada, southern Utah, and Arizona. Type locality: drifting sand hills near St. George, Utah. April-July.

2. FUNÁSTRUM Fourn. Ann. Sci. Nat. VI. 14: 388. 1882.

Perennial herbs or shrubby plants, with usually twining stems, herbage glabrous, pubescent or tomentose. Leaves opposite, petioled, variously shaped. Flowers in axillary pedunculate umbels. Calyx 5-parted, the lobes narrow, acute. Corolla deeply 5-parted, the segments often spreading or reflexed in age. Outer crown a low ring, the inner a

circle of 5 fleshy scales adnate to the base of the short stamen-column. Anther-sacs tipped by a scarious inflexed appendage at apex; pollen-masses solitary in each anther-sac, pendulous. Seeds compressed, with a conspicuous coma. [Name from the Latin words *funis*, rope, and *astrum*, star, in reference to the character of the stem and flowers.]

A genus of about 40 species, natives of the southwestern United States, Florida, Mexico, Central and South America. Type species, *Funastrum angustissimum* (Anderss.) Fourn.

Plants nearly or quite glabrous; flowers purplish; scales of the inner crown globose-ovoid, broader than long, free from the annular crown; fruiting follicle solitary, perpendicular to the pedicel. 1. *F. heterophyllum*.

Plants densely hirsutulous; flowers greenish yellow; scales of the inner crown oblong-ovoid, distinctly longer than broad, adnate at base to the outer annular crown; fruiting follicles usually in pairs, diverging at right angles to the pedicel. 2. *F. hirtellum*.

1. *Funastrum heterophyllum* (Engelm.) Standley. Climbing Milkweed or Townula. Fig. 3833.

Sarcostemma heterophyllum Engelm. Pacif. R. Rep. 5: 362. 1857.

Philibertia linearis var. *heterophylla* A. Gray, Syn. Fl. N. Amer. 2¹: 88. 1878.

Philibertia Hartwegii var. *heterophylla* Vail, Bull. Torrey Club 24: 308. 1897.

Funastrum heterophyllum Standley, Contr. U.S. Nat. Herb. 23: 1170. 1924.

Philibertia heterophylla Jepson, Man. Fl. Pl. Calif. 770. 1925.

Stems slender, twining freely over low shrubs, 5–25 dm. long, herbage very thinly strigose-hirsutulose. Leaves short-petioled, narrowly linear to linear-lanceolate, 1.5–5 cm. long, 1–10 mm. broad, the broadest often subhastate at base; peduncles 1–4 cm. long; umbels few- to many-flowered; rays 5–12 mm. long, subtended by several subulate bracts; corolla-lobes purplish especially on the back, ovate, 5–6 mm. long puberulent; follicles long-attenuate, 7–10 cm. long, thinly puberulent or glabrous, usually only one maturing and remaining perpendicular to the pedicel; seed 5 mm. long, papillose-roughened.

Dry slopes, mesas and bajadas, Upper and Lower Sonoran Zones; interior valleys of southern California, from Los Angeles and San Bernardino Counties, south to Lower California, east through the Colorado Desert to southern Utah, Arizona, and Sonora. Type locality: "Near Fort Yuma." April–Aug.

2. *Funastrum hirtellum* (A. Gray) Schlechter. Trailing Townula. Fig. 3834.

Sarcostemma heterophyllum var. *hirtellum* A. Gray, Bot. Calif. 1: 478. 1876.

Philibertia linearis var. *hirtella* A. Gray, Syn. Fl. N. Amer. 2¹: 88. 1878.

Philibertia hirtella Vail, Bull. Torrey Club 24: 309. 1897.

Philibertia hirtella Parish, Muhlenbergia 3: 126. 1907.

Funastrum hirtellum Schlechter, Rep. Spec. Nov. 13: 286. 1914.

Stems very slender, 1–3 m. long, trailing on the ground or sometimes climbing over low shrubs, densely hirsutulose. Leaves less variable than in the preceding, narrowly linear to narrowly linear-lanceolate, 1.5–4 cm. long, 1–4 mm. broad, acute to obtuse at base, never hastate; peduncles and umbels as in the preceding species; corolla greenish yellow, the lobes ovate, 4–5 mm. long, puberulent; follicles 3–4 cm. long, densely puberulent and cinereous, both usually maturing, soon strongly diverging and forming a right angle to the pedicel.

Desert washes and canyons, Lower Sonoran Zone; Death Valley and eastern Mojave Desert, south to the Colorado Desert, California, east to southern Nevada, and Arizona. Type locality: Fort Mohave, Arizona. March–May.

3. *GONÓLOBUS* Michx. Fl. Bor. Amer. 1: 119. 1803.

Perennial herbs or shrubs, with slender usually scandent stems, and opposite usually cordate, petioled leaves. Flowers in axillary, pedunculate, cyme-like fascicles or umbels, 5-merous. Calyx deeply 5-cleft or 5-parted, glandular within. Corolla green, brown or nearly black, rotate, 5-parted, the tube very short, the lobes convolute in the bud. Crown adnate to the corolla-tube, annular or cup-shaped, entire or lobed. Stamens with connate filaments forming a tube, inserted on the base of the corolla; anthers tipped with a small scarious inflexed membrane, the sacs usually more or less transversely dehiscent; pollen-masses solitary in each sac, horizontal. Stigma flat-topped. Follicles thick, acuminate, smooth, angled or tuberculate. Seeds compressed, with conspicuous coma. [Name Greek, meaning angle and pod.]

A genus of about 75 species, native of the warm temperate and tropical regions of North and South America. Type species, *Gonolobus gonocarpus* (Walt.) Perry.

1. *Gonolobus parvifolius* Torr. Spearleaf or Talayote. Fig. 3835.

Gonolobus parvifolius Torr. Bot. Mex. Bound. 166. 1859.

Lachnostoma hastulatum A. Gray, Proc. Amer. Acad. 11: 87. 1876.

Gonolobus hastulatus A. Gray, Proc. Amer. Acad. 12: 78. 1876.

Vincetoxicum hastulatum Heller, Muhlenbergia 1: 2. 1900.

Vincetoxicum parvifolium Heller, op. cit.

Gonolobus californicus Jepson, Man. Fl. Pl. Calif. 771. 1925.

Matelea parvifolia Woodson, Ann. Mo. Bot. Gard. 28: 230. 1941.

Suffrutescent, more or less twining, 1–4 dm. high, the stems puberulent with minute recurved hairs. Leaves cordate-sagittate, 5–20 mm. long, short-petioled, sparsely strigose with incurved hairs; flowers solitary or rarely two in the axils, short-pedicelled; calyx-lobes 1.5 mm. long;

corolla greenish purple, the lobes oblong, spreading, 3-4 mm. long; crown corolla-like, 5-lobed, borne on the base of the corolla-tube and nearly as high as the stamen-column to which it is attached by 5 thin vertical plates; follicles 5-7 cm. long, sparsely muricate.

Rocky places, Lower Sonoran Zone; Mojave Desert (near Kelso) and in the Colorado Desert (Ironwood Well, Corn Springs, Cottonwood Springs), California, south to Lower California, and east to western Texas. Type locality: "Sides of hills, cañon of the Rio Grande, below Mt. Carmel, October; Parry. Mountain near the Limpia, western Texas; Wright." March-April or in other months, depending upon time of local rain.

4. *SOLANÒA* Greene, Pittonia 2: 67. 1890.

Herbs with a stout perennial root, and flattened stems. Umbels terminal or on stout peduncles from the upper axils. Calyx 5-parted, the lobes lanceolate. Corolla 5-parted, the lobes reflexed in anthesis. Crown of 5 erect hood-like segments, adnate to the filament-column on the inner surface, and slit vertically on the outer surface from apex to base, without horn-like appendages at apex. Anthers tipped with a scarious membrane at apex. Follicles smooth. [Name in honor of Solano, chief of the Suisunes.]

A monotypic Californian genus.

1. *Solanoa purpurascens* (A. Gray) Greene. Solanoa or Ground Milkweed. Fig. 3836.

Gomphocarpus purpurascens A. Gray, Proc. Amer. Acad. 10: 76. 1874.

Solanoa purpurascens Greene, Pittonia 2: 67. 1890.

Asclepias Solanoana Woodson, Ann. Mo. Bot. Gard. 28: 207. 1941.

Stems few from a woody taproot, prostrate, 2-3 dm. long, flattened and flexuous, herbage puberulent, with minute incurved hairs. Leaves short-petioled, the blades ovate to elliptic-ovate, the lower obtuse to rounded at base, the upper cordate, obtuse at apex, slightly fleshy; umbels 1-3; peduncles 2-3.5 cm. long; pedicels 7-10 mm. long; calyx scarcely 1 mm. long; corolla-lobes red-purple, 2.5 mm. long; hoods saccate, 1.5 mm. long, brownish yellow, attached from the base to the apex of the filament-column; anthers 2 mm. long; follicles about 5 cm. long, usually only one maturing.

Serpentine outcrops, Upper Sonoran and Arid Transition Zones; North Coast Ranges in Lake and Colusa Counties, California. Type locality: "California, on the bare summit of a mountain in Lake County, not far from the Geysers." Collected by C. B. Towle. Isotype specimens in the Rattan herbarium give the locality "at summit to Geysers, on the road from Calistoga." June.

5. *ASCLÈPIAS* L. Sp. Pl. 214. 1753.

Perennial herbs, with erect or decumbent stems, and opposite, verticillate or rarely alternate, entire leaves. Flowers in terminal or axillary, usually pedunculate umbels. Calyx 5-parted or 5-divided, the segments usually small, acute, often glandular within. Corolla 5-parted, the segments mostly valvate in the bud, reflexed in anthesis. Crown usually with a column, the lobes 5, concave and hood-like, spreading or erect, each bearing within a slender or subulate, included or exserted horn (wanting in *cordifolia* and *californica*). Filaments connate into a tube; anthers tipped with an inflexed scarious membrane, winged, the wings broadened below the middle; pollen-masses solitary in the sacs, pendulous on their caudicles. Stigma nearly flat, 5-angled or 5-lobed. Follicles acuminate. Seeds compressed, comose. [Name in honor of the ancient Greek physician Aesculapius.]

A genus of about 90 species, natives of the western hemisphere. Type species, *Asclepias syriaca* L.

Hoods without horn-like processes on the inner surface; leaves broad; pedicels deflexed in fruit.

Herbage green and appearing glabrous, but usually minutely puberulent under a hand lens; hoods oblong-cylindric, open down the inner side. 1. *A. cordifolia*.

Herbage densely white-woolly; hoods spheroid, open at the apex and half to two-thirds the way down the back. 2. *A. californica*.

Hoods with horn-like processes on the inner surface.

Hoods about equaling the stamens and stigmas.

Pedicels deflexed in fruit; leaves lanceolate-ovate or broader.

Corolla-lobes over 10 mm. long; column none; horns subulate-falcate, included. 3. *A. cryptoceras*.

Corolla-lobes not over 10 mm. long; column present.

Lateral umbels sessile or subsessile; horns not exserted, rather blunt at apex; filament-column with a pair of slender erect teeth subtending the anther-wings. 4. *A. vestita*.

Lateral umbels well-peduncled; horns subulate and acute at apex; filament-columns without teeth. 5. *A. eriocarpa*.

Leaves often in whorls of three; horns but slightly exserted. 6. *A. erosa*.

Leaves opposite; horns well-exserted, sickle-shaped and incurved over the summit of the stigmas. 7. *A. mexicana*.

Pedicels erect in fruit; leaves narrowly linear to narrowly lanceolate. 8. *A. albicans*.

Stems herbaceous, green; leaves persistent. 9. *A. speciosa*.

Stems shrubby, white; leaves early deciduous. 10. *A. nyctaginifolia*.

Hoods two or three times as long as the stamens and stigmas; pedicels deflexed in fruit. 11. *A. subulata*.

Hoods open, plane, lanceolate above the broad base; leaves broadly ovate.

Hoods with their sides closely appressed; horn attached toward the apex of the hood.

Leaves broad; stems herbaceous, decumbent.

Leaves almost filiform, often wanting; stems erect, often woody below.

1. *Asclepias cordifolia* (Benth.) Jepson. Purple Milkweed. Fig. 3837.

Acerates cordifolia Benth. Pl. Hartw. 323. 1849.
Asclepias ecornuta Kell. Proc. Calif. Acad. 1: 55. 1855.
Acerates atropurpurea Kell. Proc. Calif. Acad. 1: 65. 1855.
Gomphocarpus cordifolius A. Gray, Bot. Calif. 1: 477. 1876.
Asclepias cordifolia Jepson, Fl. W. Mid. Calif. 384. 1901.

Stems herbaceous, erect, 3–10 dm. high, from a stout woody root; herbage green often tinged with purple, glabrous or more often minutely and rather sparsely puberulent with forked hairs. Leaves opposite, cordate-clasping, broadly ovate to ovate-lanceolate, 6–15 cm. long, 2.5–9 cm. wide, acute or short-acuminate at apex; umbels 1 to several at the apex and often in the axils of the upper much-reduced bract-like leaves, few- to many-flowered; pedicels glabrous or sparsely pubescent; calyx-lobes dark purple, thinly pubescent; corolla-lobes dark red-purple, oblong, 7–9 mm. long, glabrous on the back; hood purplish, short-cylindric, open at the top and cleft down the inner surface, truncate at apex, with the inner angles prolonged upward into lanceolate tooth-like projections; follicles lanceolate, straight, divergent, long-acuminate, 10–14 cm. long; fruiting pedicels reflexed.

Canyons and hillsides, especially in rocky situations, Upper Sonoran and Arid Transition Zones; Josephine and Klamath Counties, southern Oregon, south to Solano County in the Coast Ranges and Kern County in the Sierra Nevada, California, also western Nevada. Type locality: Marysville Buttes, Sutter County, California. April–June.

2. *Asclepias californica* Greene. California or Round-hooded Milkweed. Fig. 3838.

Acerates tomentosa Torr. Bot. Mex. Bound. 160. pl. 44. 1859. Not *Asclepias tomentosa* Ell. 1821.
Gomphocarpus tomentosus A. Gray, Bot. Calif. 1: 477. 1876. Not Buch. 1822.
Gomphocarpus tomentosus var. *Xantii* A. Gray, loc. cit.
Asclepias californica Greene, Erythea 1: 92. 1893.
Gomphocarpus Torreyi J. F. Macbride, Contr. Gray Herb. No. 65:42. 1922.
Gomphocarpus Torreyi var. *Xantii* J. F. Macbride, loc. cit.

Stems herbaceous, erect, 3–7 dm. high; herbage hoary with a dense woolly-arachnoid pubescence. Leaves opposite, oblong-lanceolate to broadly ovate, acute or short-acuminate to obtuse at apex, obtuse to cordate at base, sessile or short-petioled, 3–15 cm. long, 2–8 cm. wide; umbels sessile or on short peduncles, 6–12-flowered; calyx-lobes and outer surface of corolla-lobes white-woolly, the latter purple, 8–10 mm. long, hoods maroon, broadly ovoid, centrally attached to the column, about 4 mm. high, distinctly shorter than the anthers, cleft down the back to a little below the middle; horns none; follicles ovoid, acuminate, 7–10 cm. long, about 3 cm. thick, white-woolly.

Mostly in open woods, Upper Sonoran and Arid Transition Zones; Contra Costa County in the Coast Ranges, and Mariposa County, in the Sierra Nevada, south to San Diego County, California. Type locality: mountains east of San Diego, California. April–July.

3. *Asclepias cryptoceras* S. Wats. Humboldt Milkweed. Fig. 3839.

Acerates latifolia Torr. in Frem. Second Rep. 317. 1845. Not *Asclepias latifolia* Raf.
Asclepias cryptoceras S. Wats. Bot. King. Expl. 283. pl. 28. 1879.
Asclepias Davisii Woodson, Ann. Mo. Bot. Gard. 26: 261. 1939.

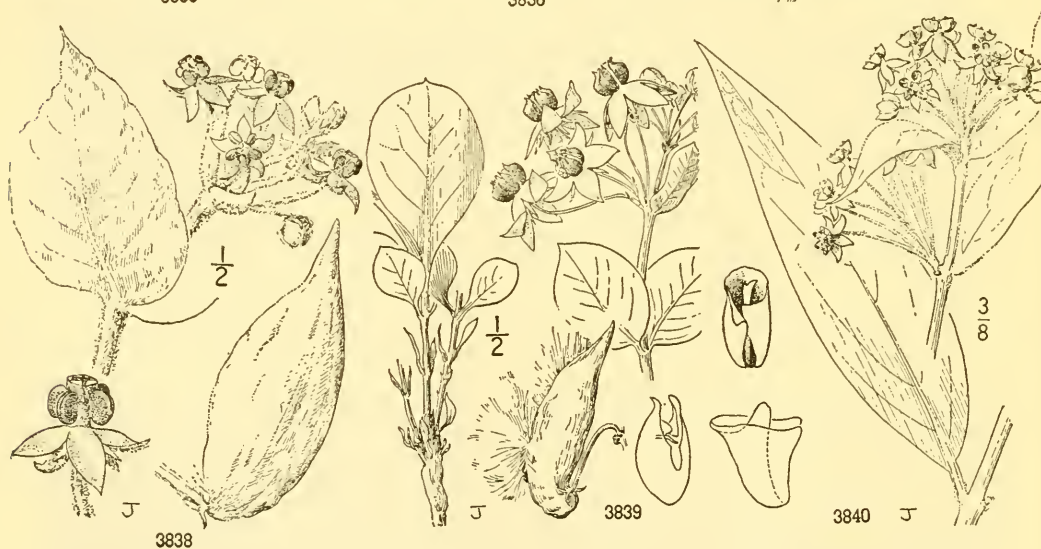
Stems prostrate, 10–30 cm. high, more or less flattened; herbage glabrous, except on the leaf-margins, bracts and calyx-lobes. Leaves opposite, broadly oval or suborbicular, 3–9 cm. long, 2–7 cm. wide, rather thick and glaucous-green, rounded or shallowly subcordate at base, rounded and often mucronate at apex, short-petioled; umbels 2–3, few-flowered, all at the summit, the terminal short-peduncled, the lateral sessile and from the same node as the terminal one, or rarely also from the node below; corolla-lobes greenish yellow, ovate, 10–12 mm. long; hoods attached from the base of the column, saccate-ovoid, flesh-colored, equaling the anthers, abruptly and minutely bi-acuminate at apex, cleft for a short distance down the back; horn falcate-subulate, completely enclosed in the hood; fruiting pedicels decurved; follicles ovoid, rather short-acuminate, 3–5 cm. long.

Loose gravelly or rocky soils, Upper Sonoran and Arid Transition Zones; Grant County, eastern Oregon, to Mono County, California, east to Wyoming and Colorado. Type locality: "West Humboldt Mountains, near Humboldt Lake, rare; 5000 feet altitude," Nevada. April–June.

4. *Asclepias vestita* Hook. & Arn. Woolly Milkweed. Fig. 3840.

Asclepias vestita Hook & Arn. Bot. Beechey 363. 1838.

Stems herbaceous, several, simple, 3–6 dm. high, herbage arachnoid-woolly, the umbels and nascent parts densely so, more or less glabrate in age. Leaves opposite, ovate-lanceolate to lanceolate, short-petioled, acute to subcordate at base, acute to acuminate at apex, 7–17 cm. long; umbels in the upper axils, usually 1–3 on a stem, the lateral sessile or on very short peduncles many-flowered; pedicels slender and weak, 2.5–3 cm. long, densely hoary-arachnoid at flowering time; corolla-lobes hoary on the back, 6–7 mm. long, cream-colored, or the tips tinged with reddish purple; hoods white, with a brown stripe down the middle of the outer side, 3 mm. long, slit down the inner side, truncate at summit with the inner edge sharply acute or somewhat auriculate; horn about equaling or usually a little shorter than the hood, rather blunt at the apex and only slightly incurved; wings of the anthers subtended by 2 small teeth,



3832. *Astephanus utahensis*
 3833. *Funastrum heterophyllum*
 3834. *Funastrum hirtellum*

3835. *Gonolobus parvifolius*
 3836. *Solanum purpurascens*
 3837. *Asclepias cordifolia*

3838. *Asclepias californica*
 3839. *Asclepias cryptoceras*
 3840. *Asclepias vestita*

attached to the column; fruiting pedicels reflexed; follicles hoary when young, glabrate at maturity, ovoid, about 6 cm. long and 2.5 cm. thick.

Dry flats and slopes, Upper Sonoran Zone; South Coast Ranges and foothills of the Sierra Nevada, California, from Stanislaus County to San Luis Obispo County, and from San Joaquin and Calaveras Counties to Fresno County; also reported from Carpinteria, Santa Barbara County. Type locality: California. Collected by Douglas, probably in Monterey County or on his trip from Monterey to Santa Barbara. May-June.

Asclepias vestita var. *Parishii* Jepson, Man. Fl. Pl. Calif. 772. fig. 779. 1925. Less arachnoid, especially the inflorescence; leaves firmer more commonly ovate and rounded or subcordate at base, the arachnoid pubescence becoming denuded at flowering time; pedicels 1.5-2.5 cm. long; flowers purple; the minute teeth subtending the anther wings, sometimes more reduced. Western rim of the Mojave Desert, from Antelope Valley to Hesperia; also in Inyo County, according to Jepson. Type locality: Cajon Pass, San Bernardino County. According to the specimens in the Parish Herbarium, Asa Gray proposed to name the variety after the desert, but his name was never published.

5. *Asclepias eriocarpa* Benth. Kotolo or Indian Milkweed. Fig. 3841.

Asclepias eriocarpa Benth. Pl. Hartw. 323. 1849.

Asclepias Fremontii Torr. ex A. Gray, Syn. Fl. N. Amer. 2: 93. 1878.

Asclepias Kotolo Eastw. Zoe 5: 86. 1900; 5: 98. 1901.

Stems herbaceous, simple and erect, 4-8 dm. high, herbage hoary-tomentose throughout. Leaves opposite or at least some of them often in whorls of 3 or 4, broadly oblong to oblong-lanceolate, 6-18 cm. long, 2.5-8 cm. broad, truncate to subcordate at base, rounded to obtuse at apex; petioles seldom over 3-5 mm. long; umbels 1 or 2, or more commonly several in the upper axils, all peduncles many-flowered; pedicels 2-3 cm. long, densely white-woolly; corolla-lobes oblong-ovate, cream-colored, 4-5 mm. long; hoods a little shorter than the anthers, cream-colored or flushed with rose-purple; horn broad at base, falcate, tapering to the pointed slightly protruding apex; follicles 6-10 cm. long, 2-2.5 cm. thick, rather short-acuminate at apex, tomentose.

Dry washes, benches and slopes, Upper Sonoran and Arid Transition Zones; Mendocino and Shasta Counties, southward through the valleys and lower altitudes of the Sierra Nevada and Coast Ranges to northern Lower California. At the southern end of the range the leaves are mostly narrower and usually acute at apex. Type locality: "Tularcitos in vicinibus Monterey," California. May-Aug.

6. *Asclepias erosa* Torr. Desert Milkweed. Fig. 3842.

Asclepias erosa Torr. Bot. Mex. Bound. 162. 1859.

Asclepias leucophylla Engelm. Amer. Nat. 9: 348. 1875.

Asclepias leucophylla var. *obtusata* A. Gray, Bot. Calif. 1: 620. 1876.

Asclepias erosa var. *obtusata* A. Gray, Syn. Fl. N. Amer. 2: 94. 1878.

Asclepias obtusata Greene, Leaflets Bot. Obs. 2: 232. 1912.

Asclepias Rothrockii Greene, loc. cit.

Stems herbaceous, 5-8 dm. high, finely lanate, usually becoming thinly so or glabrate at flowering time. Leaves glabrate and green in age, sessile, ovate to ovate-lanceolate, acute or acuminate, cordate at base, 5-20 cm. long, 2.5-10 cm. wide, coriaceous, the margin minutely and irregularly denticulate or eroded; umbels all peduncled, usually solitary and racemously disposed in the upper axils, the peduncles often forked at apex and giving rise to one or more short secondary peduncles thus forming a compound umbel; pedicels numerous, very slender and weak in anthesis, more or less densely white-woolly; corolla-lobes greenish white, more or less tomentose on the back, 5-6 mm. long; hoods a little exceeding the stamens, broadly obovoid, truncate at apex; horn attached near the base of the hood, well-exserted and curved over the stamens and stigma; follicles short-acuminate, 5-8 cm. long, 2-2.5 cm. thick, minutely tomentose, patches of the white tomentum remaining on mature fruit simulate mildew.

Open desert and Upper and Lower Sonoran Zones; Upper San Joaquin Valley and Inyo County, California, south through the Mojave and Colorado Deserts to Lower California, east to Nevada, Utah, and Arizona. Type locality: Metate, Gila River Valley, Arizona. April-Sept.

7. *Asclepias mexicana* Cav. Narrow-leaved Milkweed. Fig. 3843.

Asclepias mexicana Cav. Ic. 1: 42. pl. 58. 1791.

Asclepias fascicularis Deene. in A. DC. Prod. 8: 569. 1844.

Stems erect, 5-10 dm. high, glabrous or sparsely puberulent. Leaves in whorls of 3-6, or the lower and uppermost opposite, linear to linear-lanceolate, 6-15 cm. long, 4-20 mm. wide, short-petioled; umbels several in the upper axils, many-flowered; peduncles 2-5 cm. long; pedicels 6-10 mm. long; flowers greenish white or the corolla-lobes often tinged with purple, these oblong, 4-5 mm. long; hoods broadly ovate, 2 mm. long; horns subulate, well-exceeding the hoods and incurved over the tops of the anthers; follicles lanceolate-acuminate, 6-9 cm. long; seeds 6 mm. long, narrowly wing-margined, and irregularly reticulate-wrinkled.

Dry ground, Upper Sonoran and Transition Zones; Spokane River, eastern Washington and northern Idaho, south through eastern and western Oregon and California to Lower California, east to Nevada and Utah and through the Mexican Plateau region to near Mexico City, the type locality. June-Oct.

8. *Asclepias albicans* S. Wats. White-stemmed or Wax Milkweed. Fig. 3844.

Asclepias albicans S. Wats. Proc. Amer. Acad. 24: 59. 1889.

Stems branching and shrubby, 1-3 m. high, the surface more or less covered with a thin white exudation. Leaves caducous, in whorls of three, linear-filiform; umbels on peduncles about 1.5 cm. long, many-flowered; pedicels exceeding the peduncles; bracts early deciduous, these, the calyx and pedicels tomentose; corolla-lobes greenish white or sometimes tinged with

tan or pink, 5–6 mm. long; hoods yellow, shorter than the stamens; horns with the tips barely exerted; pedicels erect in fruit; follicles tomentulose when young, narrowly lanceoloid, tapering at both ends, 8–11 cm. long, about 12 mm. thick.

Dry rocky canyons and washes, Lower Sonoran Zone; southeastern Mojave Desert and the Colorado Desert, California, to Lower California and Arizona. Type locality: Los Angeles Bay, Lower California. Dec.–May.

9. *Asclepias speciosa* Torr. Greek or Showy Milkweed. Fig. 3845.

Asclepias speciosa Torr. Ann. Lyc. N.Y. 2: 218. 1828.

Asclepias Douglasii Hook. Fl. Bor. Amer. 2: 53. pl. 142. 1834.

Stem simple, stout 4–12 dm. high, herbage more or less hoary-tomentose throughout, or glabrate especially below, pale green. Leaves opposite, short-petioled, ovate-lanceolate to broadly ovate, acute or obtuse at apex, cordate or rounded at base, 7–15 cm. long, 3–10 cm. broad; peduncles 2–8 cm. long; umbels usually several, all pedunculate, many-flowered; pedicels and calyx densely hoary-tomentose; corolla-lobes rose-purple, 8–10 mm. long, lanceolate, obtuse, tomentose on the back; hoods contracted above the broad involute base into a flat lanceolate tip, two to three times as long as the stamens, pale pink; horn about 3 mm. long, inflexed over the stamen-column; follicles narrowly ovoid, 6–10 cm. long, densely white-lanate, with scattering soft prickly-like processes.

Stream banks, moist meadows, open fields or slopes, Upper Sonoran and Transition Zones; British Columbia to California, east to Minnesota and Oklahoma. In the Pacific States mainly east of the Cascade Mountains, in Washington, also Oregon, but extending into Josephine and Jackson Counties; in California it is in the North Coast Ranges to Solano County, the Sacramento Valley, and both sides of the Sierra Nevada to Fresno and Inyo Counties. Type locality: Canadian River. May–Aug.

10. *Asclepias nyctaginifolia* A. Gray. Mojave Milkweed. Fig. 3846.

Asclepias nyctaginifolia A. Gray, Proc. Amer. Acad. 12: 69. 1876.

Podostemma nyctaginifolium Greene, Pittonia 3: 237. 1897.

Stems several from the crown of a rather slender rootstock, decumbent or ascending, 10–20 cm. long, herbage light green, puberulent with short rather stiffish slightly recurved hairs. Leaves ovate to ovate-lanceolate, 5–10 cm. long, acute at apex, obtuse at base or somewhat decurrent on the 1.5–3 cm. long petioles, green and puberulent on both sides; umbels subsessile; pedicels short-pubescent; corolla greenish, the lobes oblong-lanceolate, 10–12 mm. long, thin-nish; hoods 8–10 mm. long, their sides closely appressed; horn wing-like, attached well above the middle and produced into a slender slightly exerted straight or somewhat curved point; follicles narrowly ovoid, attenuate at apex, 5–6 cm. long, puberulent.

Dry slopes of desert ranges, Sonoran Zones; Providence and New York Mountains, eastern Mojave Desert, San Bernardino County, California, east to southeastern Arizona. Type locality: Rock Springs, Providence Mountains, California. May–Sept.

11. *Asclepias subulata* Decne. Rush Milkweed or Ajamete. Fig. 3847.

Asclepias subulata Decne. in A. DC. Prod. 8: 571. 1844.

Stems several, erect, usually woody below, often branched above, stiff and rush-like, 1–2 m. high. Leaves few, or often wanting, almost filiform, 2–6 cm. long; umbels few to many, racemously arranged on the branches, mostly 3–10-flowered; peduncles 1–2.5 cm. long; pedicels rather stiff and ascending in anthesis, tomentose, the subtending bracts caducous; calyx-lobes tomentose; corolla-lobes 7–8 mm. long, greenish white, sometimes tinged with purple at the tip; hoods 6–7 mm. long, twice the length of the stamens; horn attached near the middle of the hood and included or the tip slightly exerted.

Canyons and washes, Lower Sonoran Zone; eastern Mojave Desert and Colorado Desert, California, to Nevada, Arizona, Lower California, Sonora, and Sinaloa. Type locality: "Nov. Hispania?" Probably in one of the above Mexican states. April–Dec.

6. ASCLEPIODORA A. Gray, Proc Amer. Acad. 12: 66. 1876.

Herbs, similar to *Asclepias* in general habit, with alternate or opposite leaves, and rather showy flowers in terminal, solitary or corymbose umbels. Sepals 5, lanceolate. Corolla rotate, deeply divided, the segments spreading. Hoods of the crown oblong, curved upward, crested within, the stamen-column bearing lobes or appendages alternate with the wings of the anthers and simulating an inner crown. Anthers scarious-tipped, the wings horny, narrowed below and sometimes angled above. Pollen-masses pendulous on the caudicle and longer than it. Follicles with or without soft spinose processes, ovoid, acuminate; fruiting pedicels erect or ascending on the decurved or twice-curved fruiting pedicels. Seeds conspicuously comose. [Name Greek, meaning gift of Aesculapius.]

A North American genus of about 6 species, inhabiting the southern United States and Mexico. Type species, *Asclepias viridis* Walt.

1. *Asclepiodora decumbens* (Nutt.) A. Gray. Antelope Horns. Fig. 3848.

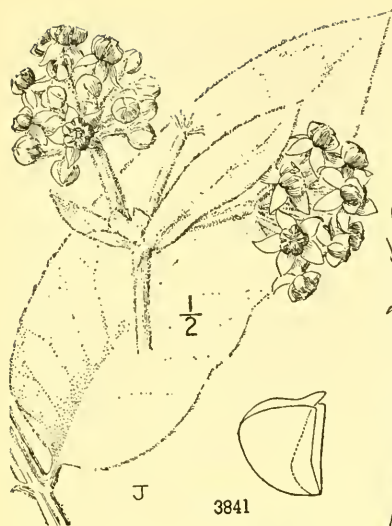
Ananthrix decumbens Nutt. Trans. Amer. Phil. Soc. II. 5: 202. 1837.

Asclepias brevicornu Scheele, Linnaea 21: 756. 1848.

Asclepiodora decumbens A. Gray, Proc. Amer. Acad. 12: 66. 1876.

Asclepias capricornu Woodson, Ann. Mo. Bot. Gard. 32: 370. 1945.

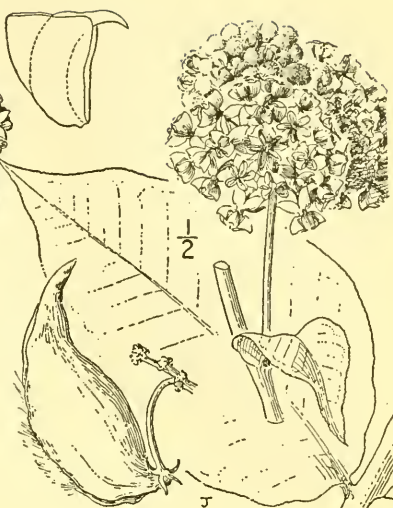
Stems herbaceous, decumbent or ascending, minutely hispidulous with recurved hairs, 25–60 cm. high. Leaves firm, ascending, lanceolate to linear, acuminate at the apex, narrowed at base to a short petiole, 3–15 cm. long; umbel solitary on a terminal peduncle, many-flowered; pedicels,



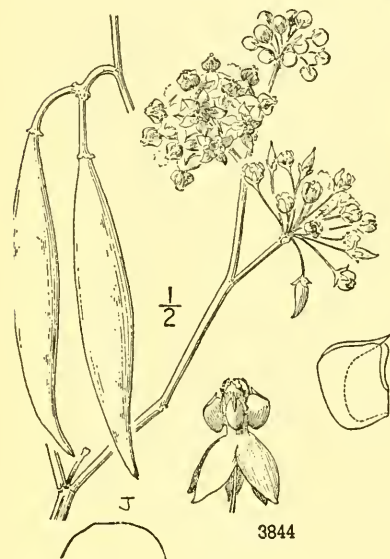
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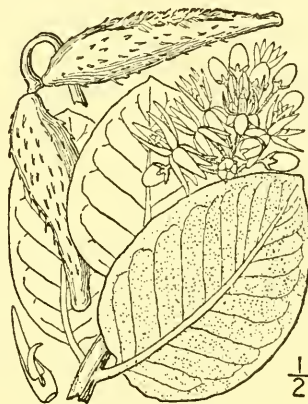
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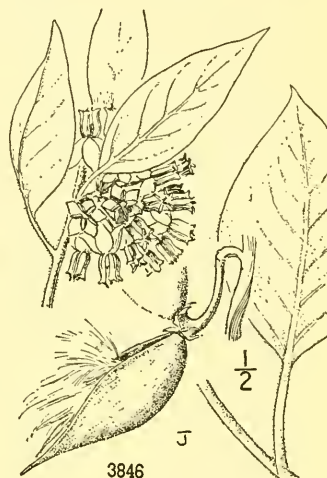
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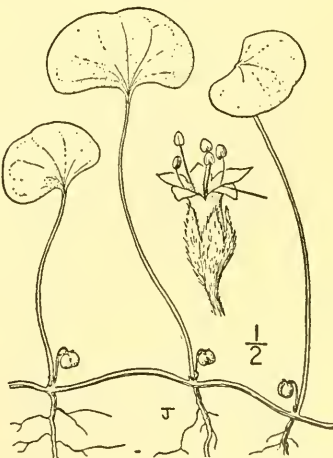
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3841. *Asclepias eriocarpa*
 3842. *Asclepias erosa*
 3843. *Asclepias mexicana*

3844. *Asclepias albicans*
 3845. *Asclepias speciosa*
 3846. *Asclepias nyctaginifolia*

3847. *Asclepias subulata*
 3848. *Asclepiodora decumbens*
 3849. *Dichondra occidentalis*

sepals and outer surface of corolla-lobes puberulent; flower depressed-globose before anthesis; corolla-lobes widely spreading, ovate to oval, 6–7 mm. long, greenish; hoods purple, 5–6 mm. long, remaining strongly incurved as in the bud; anther-wings broad, angled above; follicles erect on the decurved pedicels, with or without minute projections, puberulent.

Dry soils, Sonoran Zones; eastern Mojave Desert (Providence and Clark Mountains), California east to Utah and Kansas, and south to Arkansas, Texas, Arizona and northern Mexico. Type locality: hills near the junction of the Kiamasha and Red Rivers, Arkansas. April–June.

Family 125. DICHONDRAEAE.

DICHONDRA FAMILY.

Prostrate or creeping, annual or perennial herbs, with glabrous or silky-pubescent herbage, and small orbicular or reniform entire leaves. Flowers small, solitary on slender axillary peduncles. Sepals nearly equal, oblong to spatulate, or obovate. Corolla deeply 5-parted, the lobes spreading, induplicate in the bud. Stamens 5, with slender filaments, about equaling or shorter than the corolla. Ovary deeply 2-parted, villous, each lobe 2-celled; styles 2, simple, arising from near the base of the ovary-lobes; stigma capitate. Fruit a 2-lobed capsule, each lobe 1–2-seeded, pubescent.

Only 1 genus and about 5 species, natives of warm temperate and tropical regions. Combined by some botanists with the family *Convolvulaceae*.

1. DICHONDRA Forst. Char. Gen. Pl. 39. *pl.* 20. 1776.

The only genus in the family. [Name Greek, meaning 2-grained, in reference to the fruit.]

About 5 species, natives of warm temperate and tropical regions. Type species, *Dichondra repens* Forst.

Leaves 2–5 cm. broad, glabrous or nearly so, the sinus broad with the blade prominently cuneately decurrent; petals well-exserted, about twice the length of the calyx-lobes. 1. *D. occidentalis*.

Leaves 1–2 cm. broad, the sinus rather narrow and the blade not decurrent on the petiole; corolla-lobes barely exceeding the calyx-lobes. 2. *D. repens*.

1. *Dichondra occidentalis* House. Western *Dichondra*. Fig. 3849.

Dichondra occidentalis House, Muhlenbergia 1: 130. 1906.

Dichondra repens var. *occidentalis* Jepson, Fl. Calif. 3: 117. 1939.

Stems creeping partially or completely buried, each node bearing a single rather long-petioled leaf on the upper side and usually a simple root on the opposite side. Leaves broadly reniform, 1–3 cm. long, 2–5 cm. broad, the sinus broad with the blade prominently cuneately decurrent on the petiole, glabrate on both sides or with only a few scattering hairs; flowers usually solitary in the axils of the leaves on slender peduncles, these elongated in fruit and more or less recurved; calyx-lobes obovate, 1.5 mm. long, rounded at apex, pubescent; corolla white or purplish, the lobes 2–3 mm. long, well-exserted beyond the calyx-lobes; capsule 4 mm. high, subglobose, very shallowly lobed, sericeous-pubescent; seeds subglobose, brown, nearly or quite glabrous.

Open places or in the shade of bushes, Sonoran Zones; in the coastal area of Sonoma, Marin, Orange, and San Diego Counties, and on Santa Rosa, Santa Cruz, and Santa Catalina Islands, California; also Todos Santos Island, Lower California. Type locality: San Diego, California. March–May.

2. *Dichondra repens* Forst. *Dichondra*. Fig. 3850.

Dichondra repens Forst. Char. Gen. Pl. 40. *pl.* 20. 1776.

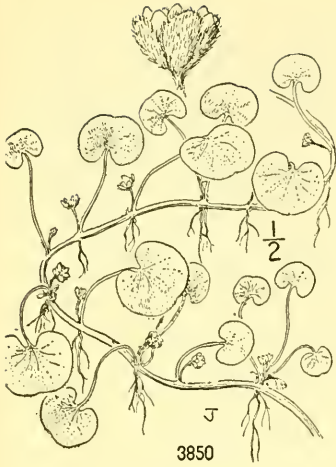
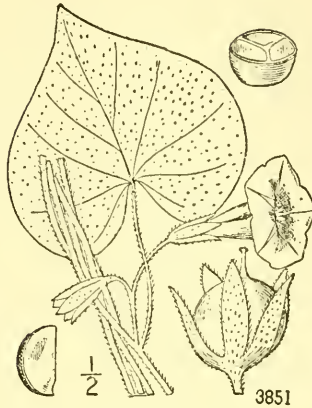
Stems creeping, forming mats. Leaves 1–2 cm. broad, suborbicular or somewhat reniform, deeply cordate, the sinus rather narrow, not decurrent on the petiole, strigose on the petiole and lower surface, only thinly so or glabrate on the upper surface; calyx-lobes oblong-obovate to broadly spatulate, 1.5–2 mm. long, silky-pubescent; corolla-lobes about equaling the calyx, ovate, acutish; capsule-lobes subglobose, 1.5–2 mm. long, thinly pilose.

Cultivated as a lawn or ground cover and sometimes growing spontaneously in the Pacific States. Native of the tropical regions. March–June.

Family 126. CONVULVULAEAE.

MORNING-GLORY FAMILY.

Herbs or some tropical species shrubs or trees, with mostly twining or trailing stems, and alternate exstipulate leaves. Flowers regular, perfect, sympetalous, axillary, cymose or solitary, 5-merous. Calyx parted or divided, usually persistent, the segments imbricated. Corolla funnelform or campanulate, the limb, angled, lobed or entire. Stamens inserted low down on the corolla-tube and alternate with the lobes; anthers 2-celled, longitudinally dehiscent. Ovary superior, 2–4-celled, with 2 ovules in each cell, entire or 2–4-divided; styles 1–3. Fruit a 2–4-valved

3850. *Dichondra repens*3851. *Ipomoea purpurea*3852. *Ipomoea hederacea*

capsule or of 2-4 distinct carpels. Seeds erect, often pubescent; embryo with foliaceous cotyledons, plaited or crumpled; endosperm scanty.

A family of 45 genera and about 1,000 species, of wide distribution, but most abundant in the tropics. Style 1; flowers showy, mostly trailing or twining vines.

Stigmas capitate.

Stigmas filiform or oblong.

Styles 2; flowers small; low erect or diffuse herbs.

1. *Ipomoea*.

2. *Convolvulus*.

3. *Cressa*.

1. *IPOMOEA* L. Sp. Pl. 159. 1753.

Annual or perennial herbs (rarely trees) with twining, trailing or sometimes erect stems, and showy axillary, solitary or corymbose, ebracteate flowers. Sepals equal or often unequal. Corolla funnelform, more or less plaited, the limb entire, angled or lobed. Stamens included, equal or unequal; filaments filiform or dilated at base; anthers ovate to linear. Ovary 2-4-celled, 4-6-ovuled; style filiform, included; stigmas 1-3, capitate. Capsule globose or ovoid, usually septifragally 2-4-valved, 2-4-seeded. [Name Greek, meaning worm-like.]

A genus of approximately 400 species of wide geographic distribution, especially in the warm temperate and tropical regions. Type species, *Ipomoea Pes-tigridis* L.

Sepals lanceolate, acute, erect; corolla 5-6 cm. long.

Sepals caudate-attenuate, the tips recurved-spreading, the base abruptly broadened; corolla 2.5-3.5 mm. long.

1. *I. purpurea*.

2. *I. hederacea*.

1. *Ipomoea purpurea* (L.) Lam. Common Morning-glory. Fig. 3851.

Convolvulus purpureus L. Sp. Pl. ed. 2. 219. 1762.

Ipomoea purpurea Lam. Tab. Encycl. 1: 466. 1791.

Pharbitis purpurea J. O. Voigt, Hort. Sub. Calcutta 354. 1845.

Annual, with twining stems 1-3 m. long, these, the peduncles and petioles retrorsely hirsute. Leaves broadly ovate, deeply cordate at base, acute at apex, 4-8 cm. wide, appressed-pubescent; peduncles 1-5-flowered; sepals oblong to lanceolate, acute, 12-16 mm. long, pubescent and often hirsute below; corolla funnelform, 5-6 cm. long, blue, purple, pink, white or variegated; ovary commonly 3-celled; stigmas 3 or rarely 2; capsule depressed-globose, about 1 cm. broad.

Commonly cultivated in gardens, and frequently escaped in the Pacific States. Native of tropical America. Type locality: "Habitat in America." June-Nov.

2. *Ipomoea hederacea* Jacq. Ivy-leaved Morning-glory. Fig. 3852.

Convolvulus hederaceus L. Sp. Pl. 154. 1753.

Ipomoea hederacea Jacq. Ic. Pl. Rar. 1: pl. 36. 1781.

Pharbitis hederacea Choisy, Mem. Soc. Genève 6: 440. 1833.

Annual, the stem slender, twining to a height of 6-15 dm., more or less retrorsely hairy. Leaves deeply 3-lobed, broadly ovate in outline, deeply cordate at base, 3-8 cm. long, sparsely appressed-pubescent, leaf-lobes contracted below; petioles and peduncles retrorsely hirsute; peduncles shorter than the petioles, 1-3 flowered; calyx-lobes 12-20 mm. long, abruptly narrowed to an elongated linear tip, densely hirsute below; corolla funnelform, 2-4 cm. long, the tube usually nearly white, the limb light blue or purple; stigmas 3; ovary 3-celled; capsule depressed-globose, 10-12 mm. high, 3-valved.

Adventive in southern California; native of southeastern United States, from Virginia to Florida, Kansas, and Texas. Type locality: Virginia and Carolina. July-Nov.

2. CONVÓLVULUS L. Sp. Pl. 153. 1753.

Herbs with trailing or twining, sometimes suffrutescent stems arising from slender mostly perennial roots or rootstocks. Leaves alternate, usually petioled, entire or dentate, and commonly cordate or sagittate. Pedicels or peduncles usually bearing a pair of bracts distant from or closely subtending the calyx. Flowers solitary or clustered in the axils, showy, white, pink or purple. Sepals about equal or the outer pair larger. Corolla funnelform or campanulate, plaited, usually 5-angled or 5-lobed. Stamens inserted on the corolla-tube, included; filaments slender or dilated at base. Ovary 2-celled or rarely 1-celled, 4-ovuled; style filiform; stigmas 2, linear-oblong or ovoid. Capsule globose or subglobose. Seeds usually 4, glabrous. [Name Latin, meaning to roll together or entwine.]

A genus of about 200 species, widely distributed in temperate and tropical regions. Type species, *Convolvulus sepium* L.

Perennials; corolla showy, 2-5 cm. long, not deeply cleft.

Bracts sepal-like, closely subtending and more or less enclosing the calyx.

Leaves reniform, fleshy; low or prostrate seaside herbs; corolla rose-purple. 1. *C. Soldanella*.

Leaves various but not reniform, slightly or not at all succulent; corolla sometimes purple or pinkish, but commonly white or yellowish.

Stems commonly twining or trailing.

Stems entirely herbaceous, from slender creeping rhizomes.

Bracts about as long as the sepals and usually concealing them; leaves hastate or in the variety sagittate. 2. *C. sepium*.

Bracts about half as long as the sepals, broadly oblong, greenish; leaves broadly oval with a narrow sinus. 3. *C. Binghamiae*.

Stems woody at least at base, commonly elongated and climbing over bushes, or in varieties of *aridus*, often shorter and little or not at all climbing.

Bracts suborbicular to oblong-oval, rounded or obtuse at apex, subcordate at base, membranous and purple; corolla 3.5-6 cm. long, white or purple-striped exteriorly on the folds; peduncles commonly 2-flowered, sometimes 1- or 3-flowered.

Leaves fleshy; bracts suborbicular to broadly oval, usually well-exceeding the calyx; insular species. 4. *C. macrostegius*.

Leaves not fleshy; bracts oval to broadly oblong, about equaling the calyx. 5. *C. cyclostegius*.

Bracts similar to the sepals, ovate-lanceolate, usually acute or acutish at apex, obtuse at base, not colored at all or only slightly; peduncle 1-flowered; corolla cream-white not purplish, 2-3 cm. long. 6. *C. aridus*.

Stems very short and erect, or 1-4 dm. long and prostrate.

Plants glabrous; leaves deltoid.

7. *C. nyctagineus*.

Plants variously pubescent.

Plants thinly pubescent or hispidulous; corolla white.

8. *C. subacaulis*.

Plants more or less densely tomentose and hoary or canescent; corolla cream-yellow.

Plants densely villous-tomentose with spreading hairs; bracts mostly ovate and as large or larger than the sepals.

9. *C. malacophyllus*.

Plants minutely tomentose with very short hairs; bracts linear-lanceolate, narrower and shorter than the sepals.

10. *C. tomentellus*.

Bracts more or less distant from the calyx and not simulating it.

Bracts hastately lobed, resembling a pair of reduced leaves; plants somewhat canescent with rather thin pilose tomentum.

11. *C. fulcratus*.

Bracts entire.

Plants minutely and rather thinly tomentulose throughout; bracts linear to linear-oblong, attached only a short distance below and partly overlapping the base of the calyx; corolla yellowish.

12. *C. polymorphus*.

Plants glabrous throughout or often more or less pubescent in *C. arvensis*; corolla white or more or less flushed with pink.

Bracts broadly oblong to oval, attached only a short distance below the calyx and their upper half overlapping its base; stems creeping 2-4 dm. long.

13. *C. Piersonii*.

Bracts linear-lanceolate to linear-subulate, usually attached about their own length or more below the calyx.

Semiwoody climbers or erect much-branched plants; native species of hills and deserts.

Stout semiwoody climbers; basal lobes of the leaves broad usually toothed.

14. *C. occidentalis*.

Erect much-branched desert plants; leaves very narrow, basal lobes linear and entire.

15. *C. longipes*.

Slender trailing or twining herb, often pubescent; bracts minute or wanting; corolla 1.5-2.5 cm. long; introduced.

16. *C. arvensis*.

Annuals; corolla about 6 mm. long, deeply 5-cleft; leaves oblanceolate, entire.

17. *C. simulans*.

1. *Convolvulus Soldanella* L. Beach Morning-glory. Fig. 3853.

Convolvulus Soldanella L. Sp. Pl. 159. 1753.

Calystegia Soldanella R. Br. Prod. 484. 1810.

Calystegia reniformis R. Br. loc. cit.

Stems creeping, short and fleshy, from deep-seated rootstocks, herbage glabrous and fleshy. Leaves long-petioled, reniform, entire or obscurely angled, 2-5 cm. broad, usually emarginate; bracts round-oval, 8-12 mm. long, obscurely cordate, mostly shorter than the sepals; sepals broadly ovate-oval, often mucronate at apex, usually 15-20 mm. long in fruit; corolla rose-purple, short-funnelform, 4-6 cm. long; stigmas ovate; capsule 12-15 mm. long, subglobose.

Beach sands; along the Pacific Coast, from Grays Harbor, Washington, to San Diego, California; also Pacific shores of Central America, Chile, New Zealand, New Caledonia, Java, and other islands of the south-

western Pacific, and again in maritime Europe from the British Islands to the Mediterranean; but not on the Atlantic Coast of either North or South America. Type locality: England. May–Sept.

2. *Convolvulus sepium* var. *repens* (L.) A. Gray. Hedge Bindweed. Fig. 3854.

Convolvulus repens L. Sp. Pl. 158. 1753.

Calystegia sepium var. *repens* A. Gray, Man. 348. 1848.

Calystegia sepium var. *pubescens* A. Gray, Man. ed. 5. 1867.

Convolvulus sepium var. *repens* A. Gray, Syn. Fl. N. Amer. 2: 215. 1878.

Convolvulus limnophilus Greene, Pittonia 3: 329. 1898.

Convolvulus sepium var. *pubescens* Fernald, Rhodora 10: 55. 1908.

Plants glabrate, puberulent to pubescent; stems rather slender, mostly twining, 6–10 dm. long; leaves rather narrowly sagittate, 4–8 cm. long, central lobe 1.5–3 cm. wide, acute or acuminate; basal lobes entire, rounded at apex, about one-third the length of the central one, somewhat divergent to nearly parallel; bracts narrowly to broadly ovate, longer than the calyx and completely enveloping it; corolla pinkish or usually white, 4–5 cm. long.

Saline marshes, Upper Sonoran Zone; on the upper branches of San Francisco Bay in Solano and Contra Costa Counties, and near San Bernardino, Chino, and Huntington Beach in southern California; also on the Atlantic Coast and in Europe. Type locality: "in Americae maritimis."

Convolvulus sepium var. *communis* Tryon, Rhodora 41: 419. 1939. Herbage glabrous or sparsely pubescent, stems twining 1–3 m. high; leaves deltoid-hastate or ovate-hastate, the basal lobes with a broad sinus, often toothed, 5–8 cm. long, 3–7 cm. broad, acute or acuminate; petioles slender, 3–5 cm. long; peduncles 6–12 cm. long; bracts closely subtending the calyx and completely covering it, ovate, acute, or acutish, auriculate, 18–24 mm. long; corolla pink, 4–5 cm. long, a little broader. Sandy fields and waste places, usually in moist soils, Transition Zones; along the Snake River and in Klickitat County, Washington; Hood River, Portland and Willamette Valley, Oregon. Probably introduced from eastern United States. Type locality: Mansfield, Ohio.

3. *Convolvulus Binghamiae* Greene. Santa Barbara Morning-glory. Fig. 3855.

Convolvulus Binghamiae Greene, Bull. Calif. Acad. 2: 417. 1887.

Convolvulus sepium var. *Binghamiae* Jepson, Fl. Calif. 3: 118. 1939.

Plant glabrous throughout, stems 1–2 m. long, twining or trailing, from creeping rootstocks. Leaves broadly oval to oblong, mostly obtuse at apex, the basal lobes parallel or only slightly divergent, entire and rounded at apex; peduncles 1-flowered; bracts closely subtending and appressed to the calyx, oval to narrowly oblong, about 8 mm. long; calyx 12–16 mm. long; corolla white, 3–4 cm. long; stigmas linear.

Swampy or marshy places, Upper Sonoran Zone; locally distributed in southern California from Santa Barbara County to Orange County. Type locality: "In marshy places about Burton's Mound, in the city of Santa Barbara." April–May.

4. *Convolvulus macrostegius* Greene. Island Morning-glory. Fig. 3856.

Convolvulus macrostegius Greene, Bull. Calif. Acad. 1: 208. 1885.

Volvulus macrostegius Farwell, Amer. Midl. Nat. 12: 130. 1930.

Convolvulus occidentalis var. *macrostegius* Munz, Man. S. Calif. 387. 1935.

Plants very sparsely tomentulose, climbing over shrubs or rocky banks, stems woody below. Leaves rather thick and fleshy, deltoid-hastate, 3–10 cm. long, and about as broad, acute or acuminate and mucronate at apex, the basal lobes more or less spreading, broad, coarsely 2–3-toothed; petioles about as long or longer than the blades; peduncle stout, 10–20 cm. long, 1–3-flowered or rarely 5-flowered; bracts thin and membranous, usually purplish, 2–3 cm. long, round-oval or round-ovate, rounded at apex and obscurely or not at all mucronate; calyx completely concealed by the closely subtending bracts, oblong-lanceolate, acute, mucronate, thin with a scarious margin.

Canyons and hillsides, Upper Sonoran Zone; on most of the islands off the coast of southern California including Santa Cruz, Anacapa, Santa Barbara, San Nicolas, and San Clemente; also San Martin and Guadalupe Islands, Mexico. Type locality: Guadalupe Island. April–July.

5. *Convolvulus cyclostegius* House. Coast Morning-glory. Fig. 3857.

Convolvulus occidentalis var. *angustissimus* A. Gray, Bot. Calif. 1: 533. 1876.

Convolvulus occidentalis var. *tenuissimus* A. Gray, Syn. Fl. N. Amer. 2: 215. 1878, as to synoptical type.

Convolvulus cyclostegius House, Muhlenbergia 4: 53. 1908.

Convolvulus occidentalis var. *cyclostegius* Jepson, Man. Fl. Pl. Calif. 776. 1925.

Plants glabrous throughout or very sparingly tomentulose, climbing over shrubs, the stems often woody below. Leaves triangular-ovate, to triangular-lanceolate, 2.5–5 cm. long, basal lobes broad usually angled or toothed, with a narrow to broad sinus; petioles usually much shorter than the blades; peduncles 3–10 cm. long, 1–2-flowered; bracts closely subtending the calyx, membranous and usually tinged with purple, orbicular or oval to oblong-oval, 10–12 mm. long, barely or not at all surpassing the calyx, obtuse to rounded at apex, rounded or commonly cordate at base, usually completely concealing the calyx; sepals ovate-lanceolate, obtuse or rounded at apex and often mucronate; corolla white, often with purple stripes along the folds on the outside of the tube, the limb sometimes flushed with pink on the second day; stigmas rather broadly linear.

Climbing over shrubs, often in great profusion, Transition and Upper Sonoran Zones; near the coast from Monterey to Ventura County, California. Type locality: "Near Monterey, on the Carmel road." March–Sept.

6. *Convolvulus aridus* Greene. Southern California Morning-glory. Fig. 3858.

Convolvulus aridus Greene, Pittonia 3: 330. 1898.

Stems usually several from the crown of a stout woody root, at first erect, later elongated and trailing or more often strongly twining, herbage somewhat cinereous with a fine rather dense tomentulose puberulence. Leaves usually with short petioles, the central lobe triangular-lanceolate, acute or obtusish, the basal lobes short acute or rounded at apex; peduncles 1-flowered, about twice as long as the leaves; bracts closely enveloping the calyx, ovate-lanceolate, acute, thin and greenish; sepals lanceolate, acute; corolla cream-white, 3-3.5 cm. long and as broad.

Mesas and foothills, Upper Sonoran Zone; interior valleys and hills of cismontane southern California from the southern slopes of the San Gabriel and San Bernardino Mountains to Riverside County and eastern Orange County, California. Type locality: "foothills in the interior southern California" (near San Bernardino). April-July.

Convolvulus aridus subsp. *intermedius* Abrams, Contr. Dudley Herb. 3: 357. 1946. Plants trailing or climbing over bushes, often for several meters, glabrous or very sparsely pilose-tomentulose; leaves variable, the central lobe triangular-lanceolate, basal lobes usually not over one-third as long as the central, entire or obscurely and broadly 2-toothed, sinus broad or rarely narrow; bracts ovate-lanceolate, acutish, 12-16 mm. long, greenish; sepals similar to the bracts, acute or short-cuspidate; corolla 3-3.5 cm. long, white or sometimes striped with purple on the folds exposed in bud. Coastal hills and valleys from the Santa Monica and Santa Susana Mountains, Los Angeles County to western Orange County, California. Type locality: near Inglewood, Los Angeles County.

Convolvulus aridus subsp. *longilobus* Abrams, Contr. Dudley Herb. 3: 358. 1946. Plants trailing or twining, sparsely and minutely tomentulose; leaves strongly hastate, the central lobe triangular-lanceolate to narrowly lanceolate, mostly 3-4 cm. long, basal lobes at least half as long as the central one, often sharply and deeply 2-toothed or bifid; peduncles 1-flowered, slender, 8-10 cm. long, those on the small-leaved branchlets only 3-4 cm. long; bracts broadly ovate to broadly oblong, thin and often reddish purple, obtuse to rounded or even truncate at apex, obtuse at base, equaling or slightly exceeding the ovate acute sepals and closely investing them; corolla white or cream-white, 3-3.5 cm. long. The typical form of the subspecies is found on low hills and in valleys in the vicinity of San Diego; northward in western Orange County it intergrades with the subspecies *intermedius*, and east of the Santa Ana Mountains in northern San Diego County and adjacent Riverside, it intergrades with the typical species and with subspecies *tenuifolius*. Type locality: San Diego.

Convolvulus aridus subsp. *tenuifolius* Abrams, Contr. Dudley Herb. 3: 359. 1946. (*Convolvulus occidentalis* var. *angustissimus* of authors, and *C. occidentalis* var. *tenuissimus* of authors, not A. Gray.) Plants smaller, glaucous-green, glabrous or thinly tomentulose, the stems very slender, mostly 1 mm. or less in diameter, at first erect, later rather closely twining over low shrubs; leaves very narrow, those in the lower parts of the stem 2-3 cm. long with the middle lobe narrowly linear-lanceolate and 2-3 mm. wide, the upper gradually smaller until the uppermost, especially those near the tips of the branchlets, almost filiform and only 5-15 mm. long, the basal lobes widely divergent, usually at right angles to central lobe and about half as wide and a third as long, entire or in the lower on the most vigorous plants sometimes 2-toothed; peduncles 1-2-flowered; bracts lanceolate to narrowly ovate-lanceolate, sharply acuminate at apex, 7-10 mm. long, membranous and rose-purple, strigose-tomentose; sepals similar to the bracts but glabrate and pale with broad scarious margins; corolla 2-3 cm. mostly 2.5 cm. long, cream-white sometimes fading purplish. Dry mesas and hillsides, mainly associated with open chaparral, Sonoran Zones; back of the immediate coast, San Diego County, California, south to northwestern Lower California. Type locality: hills near Bernardo (San Dieguito), San Diego County.

7. *Convolvulus nyctagineus* Greene. Oregon Morning-glory. Fig. 3859.

Calystegia atriplicifolia Hallier f. Bull. Herb. Boiss. 5: 385. pl. 13. 1897.

Convolvulus nyctagineus Greene, Pittonia 3: 327. 1898.

Convolvulus atriplicifolius House, Muhlenbergia 4: 54. 1908. Not Poir. 1813.

Volubilis atriplicifolia Farwell, Amer. Midl. Nat. 12: 130. 1930.

Plants with a slender slightly fleshy branching rootstock, glabrous throughout, subacaulescent or stems trailing or somewhat twining and 3-6 dm. long. Leaves ovate-cordate to broadly hastate, the basal lobes short or sometimes horizontally spreading and nearly as large as the median one; petioles, at least of the lower leaves, as long or longer than the blades; peduncles as long or longer than the leaves; bracts oval or ovate, obtuse, slightly cordate at base, 12-20 mm. long, concealing the calyx and well-exceeding it; corolla cream-white or tinged with pink, 4-5 cm. long.

Open woods and grassy slopes, mainly Transition Zones; Klickitat County, Washington, south through the Cascade Mountains and western Oregon to Del Norte, Lake, and Butte Counties, California. Type locality: Oregon. May-July.

8. *Convolvulus subcaulis* (Hook. & Arn.) Greene. Hill Morning-glory. Fig. 3860.

Calystegia subcaulis Hook. & Arn. Bot. Beechey 363. 1838.

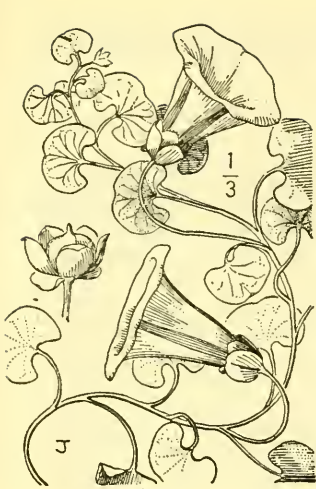
Convolvulus californicus Choisy in A. DC. Prod. 9: 405. 1845.

Convolvulus subcaulis Greene, Man. Bay Reg. 265. 1894.

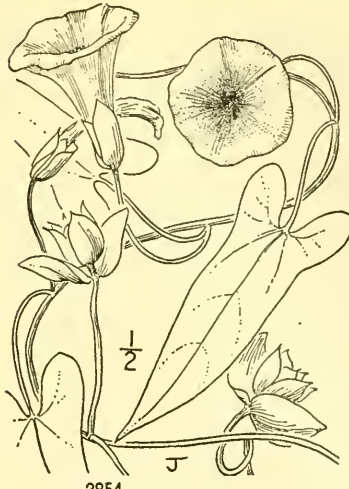
Convolvulus subcaulis var. *dolosus* Jepson, Man. Fl. Pl. Calif. 777. 1925.

Plants with very slender branching rootstocks, stemless or the stems very short, more or less pilose-pubescent throughout. Leaves long-petioled, the blades ovate-deltoid, rounded to acute at apex, cuneate to truncate at base, sometimes hastate with short lobes; pedicels much shorter than the petioles; bracts oblong to oblong-lanceolate, 12-16 mm. long, pilose or sometimes glabrous, equaling but not concealing the calyx; corolla 4.5-5 cm. long, cream-white within, tinged with purple on the folds without.

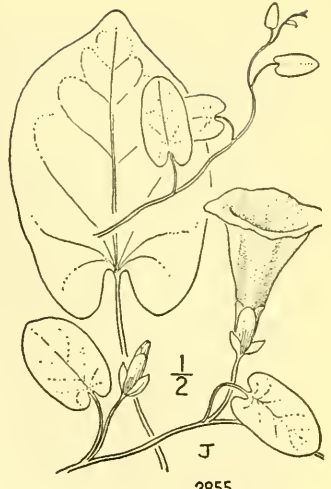
Open hillsides, Transition and Upper Sonoran Zones; central California Coast Ranges, from Tuolumne and Solano counties to San Luis Obispo County, California. Type locality: California. April-June.



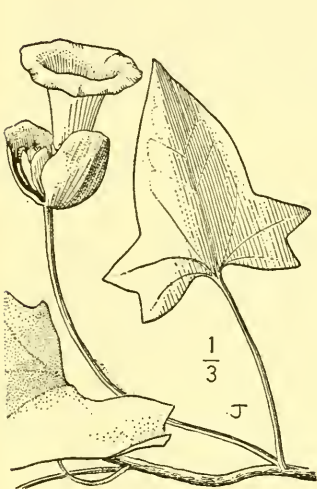
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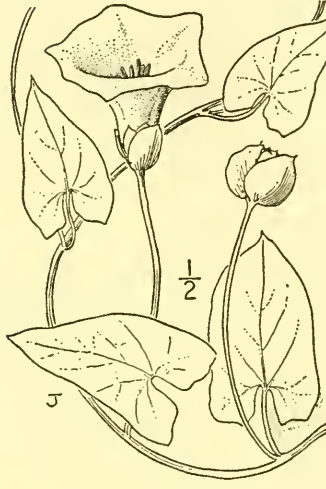
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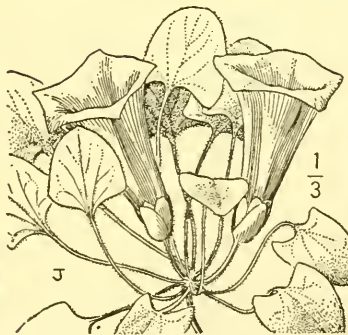
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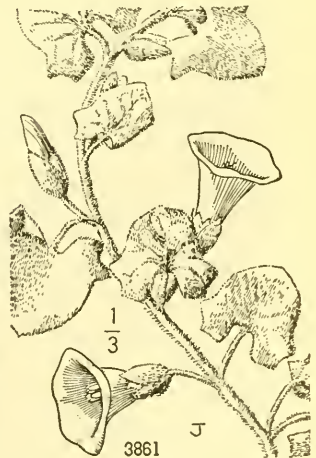
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3853. *Convolvulus Soldanella*
3854. *Convolvulus sepium*
3855. *Convolvulus Binghamiae*

3856. *Convolvulus macrostegius*
3857. *Convolvulus cyclostegius*
3858. *Convolvulus aridus*

3859. *Convolvulus nyctagineus*
3860. *Convolvulus subacaulis*
3861. *Convolvulus malacophyllus*

9. *Convolvulus malacophyllus* Greene. Sierra Morning-glory. Fig. 3861.

Calystegia villosa Kell., Proc. Calif. Acad. 5: 17. 1873.

Convolvulus villosus A. Gray, Proc. Amer. Acad. 11: 90. 1876. Not Pers. 1805.

Convolvulus malacophyllus Greene, Pittonia 3: 326. 1898.

Convolvulus chartaceus Jepson, Man. Fl. Pl. Calif. 777. 1925.

Stems ascending or trailing, 1-4 dm. long, from slender fleshy rootstocks, herbage densely cinereous-tomentose. Leaves triangular-hastate, 2-4 cm. long, and about as broad, rounded to acute at apex, the lateral lobes short and broad, often 1-2-toothed; peduncles axillary, about as long as the petioles, 1-flowered; bracts closely subtending and concealing the calyx, ovate, 12-15 mm. long; sepals ovate-lanceolate, mucronate, the outer about equaling the bracts, the inner smaller, tomentose without; corolla cream-colored, funnelform, 2.5-3.5 cm. long; seeds dark brown, 5 mm. long, finely tomentose.

Open coniferous forests, Arid Transition and Canadian Zones; Mount Eddy, Siskiyou County, south through the Sierra Nevada to Tulare County, California. Type locality: "Abundant on hillsides at Cisco, C.P.R.R., 6,000 feet high in Sierra Nevada mountains." June-Aug.

Convolvulus malacophyllus subsp. *collinus* (Greene) Abrams. (*Convolvulus collinus* Greene, Pittonia 3: 326. 1898; *C. tridactylosus* Eastw. Proc. Calif. Acad. IV. 20: 151. 1931.) Stems very short often shorter than the petioles of the tufted basal leaves, herbage often rather thinly cinereous-tomentose; leaves mostly reniform-hastate, broader than long, prominently veined beneath and usually crisped on the margin, sometimes thinner, less veiny and more or less prominently lobed (*tridactylosus*); bracts 10-12 mm. long completely concealing the calyx; outer sepals pubescent down the middle only; corolla cream-white, about 4 cm. long. Rocky or gravelly ground in open chaparral, Upper Sonoran Zone; California Coast Ranges from Lake and Napa Counties to Santa Clara and San Benito Counties. Type locality: "Dry foothills of the Coast Range, in open ground at middle elevation."

Convolvulus malacophyllus subsp. *pedicellata* (Jepson) Abrams. (*Convolvulus malacophyllus* var. *pedicellata* Jepson, Man. Fl. Pl. Calif. 777. 1925.) Stems prostrate, branching from the base, 10-35 cm. long, densely white-villous-tomentose; leaves narrowly deltoid-hastate to broadly ovate-hastate, 2-4 cm. long, hoary on both sides with a dense appressed-tomentum, the basal lobes acute or rounded, commonly entire; petioles densely tomentose with spreading hairs like the stem, those of the basal leaves longer than the blades, the upper shorter; pedicels, 1-3 cm. long; bracts ovate to ovate-oblong, obtuse or acutish at apex, 12-15 mm. long, closely subtending and equaling or surpassing the calyx, densely hairy-tomentose; sepals similar to the bracts; corolla-limit about 3.5 cm. broad. Dry washes and gravelly slopes, Upper Sonoran Zone; Inner Coast Ranges, Santa Cruz County, and Santa Lucia Mountains, Monterey County, south to Topatopa Mountains, Ventura County, California. Type locality: "Santa Paula," Ventura County, California.

10. *Convolvulus tomentellus* Greene. Kern Morning-glory. Fig. 3862.

Convolvulus tomentellus Greene, Pittonia 3: 327. 1898.

Perennial, the stems arising from slender rootstocks, branched at base, the branches several, prostrate or decumbent, 2-4 dm. long, pilose-tomentose, leafy throughout. Leaves triangular-hastate, 1.5-3 cm. long, terminal lobe narrowly triangular or broader and slightly ovate-triangular, basal lobes mostly divergent 6-10 mm. long, entire to shallowly 2-toothed, grayish green with a short slightly tomentose pubescence, petioles shorter than the blades or on the lower leaves longer; flowers mostly 1-3 on a branch; peduncles 1-2 cm. long, curved upward in flower but recurved in fruit, 1-flowered; bracts closely subtending the calyx, 7-8 mm. long, lanceolate, acute, herbaceous; sepals tomentose, the outermost narrowly ovate and acutish, the inner broadly oblong-ovate, obtuse or somewhat rounded at apex and a little longer, about 12 mm. long; corolla cream-yellow, 3 cm. long; stigmas oblong-linear, 2 mm. long.

Dry mountain slopes, Upper Sonoran and Arid Transition Zones; Greenhorn Mountains, Kern County, California. Type locality: Greenhorn Mountains, altitude 6,000-7,000 feet. June-July.

11. *Convolvulus fulcratus* (A. Gray) Greene. Sonora Morning-glory. Fig. 3863.

Convolvulus luteolus var. *fulcratus* A. Gray, Proc. Amer. Acad. 11: 90. 1876.

Convolvulus fulcratus Greene, Bull. Calif. Acad. 1: 208. 1885.

Convolvulus gracilentus Greene, Pittonia 3: 329. 1898.

Stems slender, herbaceous, usually several from a slender rootstock, 1-6 dm. high, not climbing, or sometimes the sterile tips twining, herbage light green and somewhat canescent with a rather thin pilose pubescence. Leaves 1.5-6 cm. long, narrowly to broadly triangular-hastate, the central lobe narrowly lanceolate and acute or on lower leaves sometimes broadly oblong or oblong-ovate and obtuse, the basal lobes more or less spreading about one-half to nearly as long as the central one; petioles slender shorter than the blades; peduncles very slender, usually exceeding the leaves, 1-flowered; bracts 2-10 mm. below the calyx, hastate and suggesting diminutive leaves; sepals unequal, the outer much shorter and narrower than the inner, oblong, blunt or truncate and usually mucronate at apex, pubescent; corolla white or cream-yellow, 25-35 mm. long.

Dry grassy fields and hillsides, Upper Sonoran and Lower Arid Transition Zones; foothills of the Sierra Nevada from Shasta County to Fresno County; also in the San Gabriel, San Bernardino, and Cuyamaca Mountains, California. Type locality: foothills of the Sierra Nevada near Sonora. May-Aug.

Convolvulus fulcratus var. *deltoides* (Greene) Jepson, Man. Fl. Pl. Calif. 778. 1925. (*Convolvulus deltoides* Greene, Pittonia 3: 331. 1898.) Leaves shorter, broadly deltoid-hastate, usually broader than long; whole plant canescent with a dense short tomentum. This variety replaces the species in the Tehachapi Mountains, and the Mount Pinos region, California. Type locality: Tehachapi, California.

Convolvulus fulcratus var. *Berryi* Jepson, Man. Fl. Pl. Calif. 778. 1925. (*Convolvulus Berryi*, Eastw. Proc. Calif. Acad. III. 2: 287. 1902.) Plants conspicuously villous, stems stout, 6-8 dm. long; leaves broadly deltoid-hastate to somewhat ovate-sagittate, 4-6 cm. broad and about as long, basal lobes broad more or less divergent, entire or frequently with 1 or 2 broad teeth; bracts foliaceous resembling the leaves, petioled and with a blade up to 3 cm. broad; sepals oblong-oval, 15-18 mm. long, the outer conspicuously villous. Middle

elevations, Transition Zones; southern Sierra Nevada between the Kaweah and Kings Rivers. Type locality: Millwood, Fresno County, California.

12. *Convolvulus polymorphus* Greene. Modoc Morning-glory. Fig. 3864.

Convolvulus polymorphus Greene, Pittonia 3: 331. 1898.

Low plants with slender, erect or trailing stems sometimes slightly twining at the apex, herbage grayish green and more or less puberulent. Leaves broadly to narrowly hastate or subsagittate, 2–4 cm. long, acute to rounded at apex, the basal lobes rounded to broadly and shallowly 2-toothed; petioles mostly shorter than the blades; peduncles mostly shorter than the leaves, 1-flowered; bracts 1–5 mm. below the calyx, green, linear-lanceolate to oblong, 4–10 mm. long; sepals very unequal, the outer rounded or broadly emarginate at apex, the inner usually broadly obtuse, rather obscurely mucronate, puberulent; corolla white, yellowish within, 25–30 mm. long.

Open or brushy slopes often in rocky soils, mainly Arid Transition Zone; southern Oregon from Douglas and Klamath Counties south to Lake and Nevada Counties, northern California. Type locality: northern California. April–July.

13. *Convolvulus Piersonii* Abrams. Pierson's Morning-glory. Fig. 3865.

Plants glabrous and glaucous throughout; stems slender trailing, or ascending and somewhat twining, 15–35 cm. long. Leaves lanceolate-hastate, the central lobe 15–20 mm. long, 5–10 mm. wide at base, often mucronate at apex, lateral lobes commonly nearly as long as the central and about as wide, entire or with 1 or 2 shallow teeth; petioles 5–15 mm. long; peduncles 1-flowered, 1–5 cm. long, often curved; bracts broadly to narrowly oval, closely subtending the calyx or attached a short distance below it, barely half the length of the sepals, greenish or purplish, obtuse to rounded at apex; sepals oblong-oval, 10–12 mm. long, rounded at apex and usually retrorsely mucronate; corolla white 3–4 cm. long.

Glaber et glaucus, caule herbaceo procumbente aut volubili 15–35 cm. longis, foliis lanceolatis-hastatis 15–20 mm. longis, petiolis 5–15 mm. longis, bracteis ovatis vel oval-oblongis 5 mm. longis, sepalis oblongo-ovalis 10–12 mm. longis obtusis, corolla 3–4 cm. longis.

Dry soils in open desert scrub, Sonoran Zones; Antelope Valley and base of the desert slopes of the San Gabriel Mountains, Los Angeles County, California. Type collected at Rock Creek, San Gabriel Mountains, Los Angeles County, California, *Pierson* 3537 (no. 139597 Dudley Herbarium). May–June.

14. *Convolvulus occidentalis* A. Gray. Western or Bush Morning-glory. Fig. 3866.

Convolvulus occidentalis A. Gray, Proc. Amer. Acad. 11: 89. 1876, as to original type.

Convolvulus luteolus A. Gray, Proc. Amer. Acad. 11: 90. 1876. Not Spreng. 1835.

Convolvulus luteolus var. *purpuratus* Greene, Man. Bay Reg. 265. 1894.

Convolvulus purpuratus Greene, Pittonia 3: 332. 1898.

Stems woody, climbing over shrubs or in open places trailing, glabrous or nearly so. Leaves 4–8 cm. long, triangular-hastate with a V-shaped or rounded sinus, lateral lobes often irregularly 2-toothed, terminal lobe commonly long-acuminate; petioles much shorter than the blades; peduncles well-exceeding the leaves, 1–3-flowered; bracts linear-subulate, 5–10 mm. long, 5–15 mm. below the calyx; sepals unequal, 6–12 mm. long, mostly oblong-elliptic, obtuse to truncate at apex, mucronate, coriaceous often purple-tinged; corolla pink, purple or dull creamy white.

Stream banks and canyon slopes, Transition and Upper Sonoran Zones; California Coast Ranges, Humboldt County to Monterey County. Type locality: "near San Francisco, Dr. Gibbons" according to the specimen in the Gray Herbarium on which Dr. Gray wrote the "very original of *C. occidentalis*." May–July.

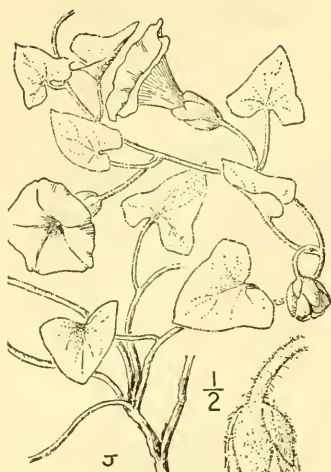
Convolvulus occidentalis subsp. *fruticetorum* (Greene) Abrams. (*Convolvulus fruticetorum* Greene, Pittonia 3: 333. 1898; *Convolvulus purpuratus* var. *fruticetorum* House, Muhlenbergia 1: 55. 1908.) Climbing over bushes, the stem woody, glabrous and glaucous; leaves 3–6 cm. long and about as broad across the broad usually toothed basal lobes, terminal lobe broadly to rather narrowly triangular, glabrous or minutely and sparsely puberulent beneath, the sinus broadly U-shaped; bracts longer than in the typical species, linear-lanceolate to narrowly oblanceolate. Josephine County, Oregon, south through the Inner Coast Ranges to Napa County, and on western slopes of the Sierra Nevada to Amador County, California. Type locality: "bushy foothills of the Inner Coast Ranges of California."

Convolvulus occidentalis subsp. *saxicola* (Eastw.) J. T. Howell, Leaflets West. Bot. 5: 45. 1947. (*Convolvulus saxicola* Eastw. Bull. Torrey Club 30: 495. 1903; *C. luteolus* var. *saxicola* Jepson, Man. Fl. Pl. Calif. 779. 1925; *C. purpuratus* var. *saxicola* Jepson, Fl. Calif. 3: 124. 1939.) Low trailing, glabrous throughout; leaves deltoid-sagittate to cordate-sagittate, 2.5–4 cm. long; peduncles slender, usually about as long as the petioles; bracts remote from the calyx, varying from lanceolate-subulate to foliaceous and lanceolate-hastate. Rocky slopes and ridges near the coast of Mendocino and Sonoma Counties, California. Type locality: "rocky summits of the more elevated parts of Bodega Point, Sonoma County."

15. *Convolvulus longipes* S. Wats. Piute Morning-glory. Fig. 3867.

Convolvulus longipes S. Wats. Amer. Nat. 7: 302. 1873.

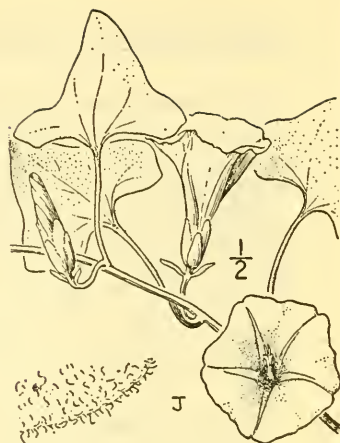
Stems erect, much-branched, glabrous throughout, the slender branches sometimes twining, 4–10 dm. high. Leaves narrowly linear to linear-lanceolate, at least the lower with prominent linear or lanceolate hastate lobes, the uppermost reduced to narrow mostly auriculate bracts; petioles slender, 1–2.5 cm. long; peduncles slender, 8–15 cm. long, bearing a single or rarely 2 pedicellate flowers at the summit; bracts linear or linear-subulate, attached about their own length below the calyx or sometimes more remote, occasionally one or both absent; sepals chartaceous, broadly oval, rounded and mucronate at the apex, the outer 6–7 mm. long, shorter



3862



3863



3864



3865



3866



3867



3869



3868



3870

3862. *Convolvulus tomentellus*
 3863. *Convolvulus fulcratus*
 3864. *Convolvulus polymorphus*

3865. *Convolvulus Piersonii*
 3866. *Convolvulus occidentalis*
 3867. *Convolvulus longipes*

3868. *Convolvulus arvensis*
 3869. *Convolvulus simulans*
 3870. *Cressa truxillensis*

than the inner; corolla broadly funnelform, often veined with lavender externally, white varying to pale yellow, 2-3 cm. long.

Dry slopes and ridges, mainly Upper Sonoran Zone; Inner Coast Ranges, San Luis Obispo County, and the southern Sierra Nevada, Kern County, southward on the desert slopes of the mountains of southern California to San Diego County, California, east through the Mojave Desert region of Mono and Inyo Counties, California, to southern Nevada. Type locality: southern Nevada. May-July.

16. *Convolvulus arvensis* L. Field Bindweed. Fig. 3868.

Convolvulus arvensis L. Sp. Pl. 153. 1753.

Glabrous or pubescent, deep-rooted herb; stems trailing, decumbent or somewhat twining, 3-10 dm. long. Leaves 2-3.5 cm. long, oblong-sagittate to ovate or somewhat hastate, rounded or obtuse at apex, slender-petioled; peduncles 1-4-flowered, shorter than the leaves; bracts remote from the calyx, mostly subulate, sometimes wanting; sepals oblong, obtuse, 3 mm. long; corolla white or pinkish, 1.5-2.5 cm. wide.

Fields and waste places; Washington to southern California, and across the continent. Naturalized from Europe. May-Oct.

17. *Convolvulus simulans* Perry. Small-flowered Morning-glory. Fig. 3869.

Breweria minima A. Gray, Proc. Amer. Acad. 17: 228. 1882. Not *Convolvulus minimus* Aubl. 1775.

Convolvulus pentapetaloides of authors, not L.

Convolvulus simulans Perry, Rhodora 33: 76. 1931.

Low diffusely branching annual, 1-3 dm. high, stems appressed-pubescent. Leaves oblong-lanceolate to linear, gradually narrowed from about the middle to a slightly winged petiole, 2-4 cm. long, sparsely villous on both sides; peduncles mostly shorter than the leaves; bracts 4-5 mm. below the flowers, subulate or narrowly oblanceolate, 3-8 mm. long; sepals oblong-ovate, 3-4 mm. long, pubescent, with broad scarious margins; corolla deeply 5-cleft, 6 mm. long, pinkish.

Valleys and hillsides, Upper and Lower Sonoran Zones; Lower Sacramento Valley (Antioch), South Coast Ranges in San Luis Obispo County, and coastal southern California (Redondo, San Diego) to Lower California. Type locality: "northern part of Lower California." March-May.

Convolvulus althaeoides L. Sp. Pl. 156. 1753. Perennial, appressed-pubescent and more or less canescent. Lowest leaves ovate-cordate, crenately toothed, the upper 3-7-lobed with the lobes irregularly toothed or divided; peduncles erect, longer than the leaves, 1-2-flowered; bracts subulate; sepals ovate-oval, 7-8 mm. long; corolla purple, 2.5-3 cm. long. Native of the Mediterranean Region; locally established as a weed in Ventura County, California.

3. *CRÉSSA* L. Sp. Pl. 223. 1753.

Low much-branched perennial plants, somewhat suffrutescent at base. Leaves alternate, small or sometimes reduced to scales, entire. Flowers solitary in the upper axils, perfect, regular, 5-merous. Sepals distinct, imbricate, equal. Corolla 5-lobed, funnelform, persistent. Stamens 5, alternate with the corolla-lobes, exserted, filaments filiform or subulate. Styles 2, distinct; stigma entire, capitate; ovary 2-celled, with 2 ovules in each cell. Fruit a capsule, often 1-seeded by abortion. [The Greek name for a female Cretan.]

A genus of several closely related species, considered by some as a single polymorphic species, inhabiting the warm temperate and tropical regions of both the Old and New World. Type species, *Cressa cretica* L.

1. *Cressa truxillensis* H.B.K. Cressa. Fig. 3870.

Cressa truxillensis H.B.K. Nov. Gen. & Sp. 3: 119. 1818.

Cressa cretica var. *truxillensis* Choisy in A. DC. Prod. 9: 440. 1845.

Cressa depressa Goodding, Bot. Gaz. 37: 58. 1904.

Cressa vallicola Heller, Muhlenbergia 8: 140. pl. 17. 1913.

Cressa minima Heller, op. cit. 140.

Cressa pumila Heller, op. cit. 142. fig. 28.

Low tufted or depressed perennial, more or less densely canescent throughout, the much-branched stems 1-2 dm. long. Leaves numerous, oblong-ovate to broadly lanceolate, sessile, entire, 4-10 mm. long; flowers solitary in the upper axils, short-pedicelled or subsessile; sepals oblong-ovate, 4 mm. long, silky-canescens; corolla white, 5-6 mm. long, lobes about 2 mm. long, spreading or relaxed, oblong-ovate, pubescent toward the apex on the outer surface; ovary and capsule pubescent.

Saline soils along the coast and in the interior, Sonoran Zones; southeastern Oregon, south through California to Lower California, east to Nevada, Utah, Arizona, and New Mexico; and also Mexico and South America. Type locality: near Truxillo, Peru. May-Oct.

Family 127. CUSCUTACEAE.

DODDER FAMILY.

Yellow or white parasitic plants, with very slender twining stems. Leaves reduced to minute alternate scales. Flowers cymosely clustered, small, white, yellow or pinkish, 5-merous or rarely 4-merous. Calyx lobed or parted or the sepals sometimes distinct. Corolla campanulate, urceolate, ovoid or cylindric, the lobes imbricate in the bud, the tube usually bearing as many fimbriate or crenulate scales as lobes and alternate with them. Stamens alternate with the lobes and inserted in the throat or sinuses above the scales, included or short-exserted; anthers ellipsoid or ovoid, 2-celled. Pistil 1, superior; ovary globose to ellipsoid, 2-celled; ovules 2 in each cell; styles 2, terminal, distinct or rarely united below; stigma linear or capitate. Capsule globose or ovoid, circumscissile or irregularly dehiscent, or indehiscent. Seeds 1-4, globose or angular, glabrous; endosperm fleshy; embryo linear, straight, curved or spiralled; cotyledons none, but apex bearing 1-4 minute scales.

1. CÚSCUTA [Tourn.] L. Sp. Pl. 124. 1753.

The only genus in the family. The seeds germinate in the soil and the slender filiform stem of the seedling soon attaches itself to an herb or shrub by means of minute lateral cup-like suckers, the root and lower free part of stem soon perishing. [Name derived from the Arabic.]

About 100 species, of wide geographical distribution but most abundant in the western hemisphere and Polynesia. Type species, *Cuscuta europaea* L.

Stigma capitate; capsule bursting irregularly.

Capsule globose or depressed-globose.

Ovary and capsule without a thickened stylopodium at apex.

Corolla bearing scale-like appendages alternating with the lobes and attached to the tube below the stamens.

Capsule globose, capped at the apex by the withered corolla; flowers 4-merous.

1. *C. Cephalanthi*.

Capsule globose or depressed-globose, withered corolla remaining about the base of the capsule. Corolla-lobes obtuse, their margins not inflexed at apex.

2. *C. obtusiflora glandulosa*.

Corolla-lobes acute, the margins inflexed at apex.

Corolla-lobes broadly overlapping at base to form angles; flowers 1.5-2 mm. long; capsule 1.5-2 mm. broad.

3. *C. pentagona*.

Corolla-lobes overlapping but not forming angles; flowers 2-3 mm. long; capsule 2.5-3 mm. broad.

Flowers in compact globular clusters; corolla-tube as broad as long, lobes about equaling the tube.

4. *C. campestris*.

Flowers in racemose clusters; corolla-tube campanulate, longer than broad, lobes erect, shorter than the tube.

5. *C. suaveolens*.

Corolla without scales on the inner surface of the tube.

Corolla-lobes erect, triangular, about as broad as long, shorter than the tube.

6. *C. Jepsonii*.

Corolla-lobes lanceolate or oblong, much longer than broad, reflexed or spreading.

Corolla-lobes oblong, acutish or obtuse, reflexed; calyx-lobes broadly ovate, usually shorter than broad.

7. *C. brachycalyx*.

Corolla-lobes lanceolate, very acute; calyx-lobes longer than broad, acute.

Anthers oval, scarcely 0.5 mm. long; corolla-lobes spreading; flowers sessile.

8. *C. occidentalis*.

Anthers linear-oblong, nearly 1 mm. long; corolla-lobes reflexed; flowers distinctly pedicelled.

9. *C. californica*.

Ovary and capsule with a thickened collar-like stylopodium surrounding the base of the styles.

10. *C. indecora neuropetala*.

Capsule ovoid, conic or beaked, commonly longer than broad; corolla with scales on the inner surface of corolla-tube.

Corolla-tube elongated, much exceeding the calyx; scales free from the corolla above their middle.

11. *C. subinclusa*.

Corolla-tube not elongated, about equaling or shorter than the calyx; scales adnate to the corolla along their median line nearly or quite their whole length.

Calyx-lobes and corolla-lobes attenuate at apex; scales adnate their whole length, their margins appearing as 2 separate wing-like appendages on the sides but not on the summit.

12. *C. Suksdorfii*.

Calyx-lobes and corolla-lobes rounded or the latter obtuse, often denticulate.

14. *C. denticulata*.

Stigma linear; capsule circumscissile.

Flowers not fleshy; calyx-lobes not thickened and turgid at apex.

15. *C. Epithymum*.

Flowers fleshy; calyx-lobes distinctly thickened and turgid at apex.

16. *C. approximata urceolata*.

1. *Cuscuta Cephalanthi* Engelm. Buttonbush Dodder. Fig. 3871.

Cuscuta Cephalanthi Engelm. Amer. Journ. Sci. 43: 336. pl. 6 figs. 1-6. 1842.

Cuscuta tenuiflora Engelm. Lond. Journ. Bot. 2: 197. 1843.

Epithymum Cephalanthi Nieu. & Lun. Amer. Midl. Nat. 4: 511. 1916.

Plant yellow, the stems medium. Flowers subsessile or sessile, clustered, about 2 mm. long, commonly 4-merous, glabrous or sometimes glandular; calyx deeply divided, shorter than the corolla-tube, the lobes oblong-ovate, obtuse, overlapping at base; corolla cylindric-campanulate in anthesis, lobes ovate, obtuse, much shorter than the tube, erect or spreading; scales oblong, fringed; stamens equaling or a little shorter than the lobes; styles equaling or a little longer than the ovary; capsule globose, often glandular, without stylopodium, capped by the persistent withered corolla.

Parasitic on various plants, Sonoran and Transition Zones; western Washington and Oregon to Maine, Texas, and Virginia. Type locality: "on the margin of ponds and swamps near St. Louis," Missouri. July-Sept.

2. *Cuscuta obtusiflora* var. *glandulosa* Engelm. Peruvian Dodder. Fig. 3872.

Cuscuta obtusiflora var. *glandulosa* Engelm. Trans. St. Louis Acad. 1: 492. 1859.

Cuscuta glandulosa Small, Fl. S.E. U.S. 969. 1903.

Stems light yellow, medium slender. Flowers glandular, about 2 mm. long, subsessile in compact glomerulate clusters, these scattered or often aggregated; calyx-lobes about equaling the corolla-tube, round-ovate, obtuse, not overlapping at base; corolla-tube, short, campanulate, lobes triangular-ovate, acutish, spreading or reflexed; stamens shorter than the corolla-lobes; scales oblong, fringed at the usually truncate apex; styles subulate, about equaling the globose ovary; capsule depressed-globose, irregularly bursting.

Parasitic on various plants, often on *Polygonum*, Sonoran Zones; southern California to Florida and south to Mexico and the West Indies. The only known California collections were made by Parish, near San Bernardino. Type locality: Durango, Mexico. April-Oct.

3. *Cuscuta pentagona* Engelm. Field Dodder. Fig. 3873.

Cuscuta arvensis Beyrich ex Hook. Fl. Bor. Amer. 2: 77, as a synonym. 1838.

Cuscuta pentagona Engelm. Amer. Journ. Sci. 43: 340. pl. 6. figs. 22-24. 1842.

Cuscuta arvensis Beyrich ex Engelm. in Gray, Man. ed. 2. 336. 1856.

Cuscuta arvensis var. *pentagona* Engelm. Trans. St. Louis Acad. 1: 494. 1859.

Stems slender, pale yellow. Flowers mostly in small loose clusters, about 1.5 mm. long and about equalled by the pedicels, more or less glandular; calyx deeply divided, lobes mostly broader than long, scarcely 1 mm. long, rounded at apex, overlapping at base; corolla-tube campanulate, shorter than the calyx; lobes spreading, lanceolate, acute, the margins strongly inflexed at apex; anthers scarcely 0.5 mm. long, shorter than the filaments; scales broadly oblong, fringed; styles slender, about equaling the ovary; capsule globose, ovoid-globose, or rarely slightly depressed, 1.5-2 mm. broad; seeds about 1 mm. long.

Parasitic on various plants, usually in fields or low ground, Sonoran and Transition Zones; eastern Oregon to southern California, east to the eastern United States, where it is more common than in the Pacific States. Type locality: Norfolk, Virginia. July-Oct.

4. *Cuscuta campestris* Yuncker. Western Field Dodder. Fig. 3874.

Cuscuta pentagona var. *calycina* Engelm. Amer. Journ. Sci. 45: 76. 1845.

Cuscuta arvensis Beyrich ex Engelm. in A. Gray, Man. ed. 2. 336, in part. 1856.

Cuscuta arvensis var. *calycina* Engelm. Trans. St. Louis Acad. 1: 495. 1859.

Cuscuta campestris Yuncker, Mem. Torrey Club 13: 138. 1932.

Stems light yellow, medium slender. Flowers short-pedicelled, in compact globular clusters, 2-3 mm. long, often glandular; calyx-lobes oval or suborbicular about concealing the corolla-tube, rounded at apex, overlapping at base when young but not protruding to form angles; corolla-lobes spreading, triangular, acute and the margins somewhat inflexed at apex, the tube campanulate, about equaling the lobes; stamens shorter than the lobes, anthers oval, shorter than the filaments; styles slender, about equaling the globose ovary; capsule depressed-globose, 2.5-3 mm. broad, with the withered corolla persisting at the base; seed about 1.5 mm. long.

Native of North America, parasitic on alfalfa, cocklebur, and various other plants, mainly Sonoran Zones; eastern Washington to southern California, east across the continent, and south to the West Indies, Mexico, and South America. Type locality: "Texas." Aug.-Oct.

5. *Cuscuta suaveolens* Ser. Fringed Dodder. Fig. 3875.

Cuscuta suaveolens Ser. Ann. Sci. Nat. II. 3: 519. 1840.

Cuscuta racemosa var. *chiliana* Engelm. Trans. St. Louis Acad. 1: 505. 1859.

Stems slender, straw-colored. Flowers in racemose clusters, short-pedicelled, membranous, more or less glandular; calyx-lobes triangular-ovate, acutish, not overlapping at base, their edges often revolute; corolla campanulate to broadly funnelform, becoming globular about the capsule in age, not circumscissile; corolla-lobes ovate-triangular, erect, about half to three-fourths as long as the tube; stamens shorter than the corolla-lobes, filaments subulate about as long as the anthers, scales broadly oblong, mostly not reaching the base of the filaments, fringed; styles slender, about as long as the globose ovary; capsule globose, surrounded by the withered persistent corolla.

Parasitic mostly on leguminous plants especially alfalfa, native of South America, but its seed widely

disseminated with alfalfa seed. In the Pacific States it has been found growing on alfalfa in Humboldt, Solano, Santa Clara, Santa Cruz, and Tulare Counties, California. Aug.-Oct.

6. *Cuscuta Jepsònii* Yuncker. Jepson's Dodder. Fig. 3876.

Cuscuta Jepsònii Yuncker, Univ. Ill. Biol. Monogr. 6: 149. fig. 52. 1921.

Stems slender, pale. Flowers cymosely clustered, the entire inflorescence fleshy and papillate; pedicels shorter than the corolla; calyx-lobes triangular, acute, barely 1 mm. long; corolla 2-2.5 mm. long, broadly urceolate, at least in age; lobes erect, becoming connivent, triangular barely half the length of the tube; stamens much shorter than the corolla-lobes; scales represented by ridges; styles much shorter than the ovary. Capsule depressed-globose, surrounded by the persistent corolla; seeds 2-4, rounded, compressed.

Parasitic on herbs and shrubs, Arid Transition Zone; North Coast Ranges, Lake County, California. Type locality: Big Horse Mountain, northern Lake County, California. The type collections were growing on *Ceanothus diversifolius* Kell. July-Sept.

7. *Cuscuta brachycalyx* Yuncker. San Joaquin Dodder. Fig. 3877.

Cuscuta californica var. *brachycalyx* Yuncker. Univ. Ill. Biol. Monogr. 6: 152. figs. 45e-f, 75. 1921.

Cuscuta brachycalyx Yuncker, Mem. Torrey Club 18: 159. 1932.

Stems medium slender, pale yellow. Flowers in loose clusters, pedicelled, about 4 mm. long, becoming thin and transparent; calyx turbinate, much shorter than the corolla, lobes short, broadly ovate, acutish or obtuse; corolla campanulate, the lobes reflexed, oblong, abruptly acute or obtuse, about equaling the tube; scale none; stamens shorter than the lobes; anthers linear-ovate, about equaling the subulate filaments; ovary globose; styles long, exserted; stigmas capitate; capsule globose, surrounded by the withered corolla; seeds about 2 mm. long, flattened on 2 sides.

Parasitic on various native herbs, especially *Eriogonum*, Sonoran and Arid Transition Zones; Inner Coast Ranges, western slopes of the Sierra Nevada, and the Sacramento-San Joaquin Valley, California. Type locality: near Hanford, Tulare County, California. June-Sept.

8. *Cuscuta occidentàlis* Millsp. Western Dodder. Fig. 3878.

Cuscuta californica var. *breviflora* Engelm. Trans. St. Louis. Acad. 1: 499. 1859.

Cuscuta occidentàlis Millsp. Field Mus. Pub. Bot. 5: 204. 1923.

Stems medium slender, yellow. Flowers sessile or short-pedicelled, usually in small compact clusters, about 3 mm. long, often glandular, 5-merous; calyx about as long as the corolla-tube, lobes ovate-lanceolate, acuminate; corolla-tube as broad as long, becoming globular in fruit, lobes lanceolate, acuminate, usually spreading, giving a star-shaped appearance to the flower as seen from above; anthers oval, scarcely 0.5 mm. long, filaments but little longer, subulate; scales none; ovary globose, styles about as long as the ovary only slightly exserted, stigmas capitate; capsule globose, about 2 mm. broad, bursting irregularly.

Parasitic on various native herbs and shrubs, Upper Sonoran and Transition Zones; northeastern Washington, to central California east to Utah and western Colorado. Type locality: Monterey, California. June-Aug.

9. *Cuscuta californica* Choisy. California Dodder. Fig. 3879.

Cuscuta californica Choisy, Mem. Soc. Genève 9: 279. 1841.

Cuscuta acuminata Nutt. ex Engelm. Trans. St. Louis Acad. 1: 498. 1859.

Cuscuta californica var. *graciliflora* Engelm. op. cit. 499.

Cuscuta californica var. *longiloba* Engelm. loc. cit.

Stems medium slender, yellow. Flowers 3-5 mm. long, distinctly pedicelled, in loose cymose-paniculate clusters; calyx turbinate, fleshy at base, lobes triangular to lanceolate, acute or acuminate; corolla-tube campanulate-cylindric, equaling or well-exceeding the calyx, lobes narrowly lanceolate, sharply acute, reflexed, usually longer than the tube; scales none; anthers oblong-linear, about twice as long as broad and about equaling the subulate filaments; styles slender, well-exserted, much longer than the globose ovary, stigmas capitate; capsule globose, surrounded by the withered corolla, bursting irregularly.

Parasitic on various native herbs and shrubs, Sonoran and Transition Zones; eastern Oregon to Nevada, California and Lower California. Type locality: "Nov. California" Douglas. Douglas is known to have collected along the coast and in the Coast Ranges of California from about Sonoma County to Santa Barbara. May-Aug.

Cuscuta californica var. *papillòsa* Yuncker, Univ. Ill. Biol. Monogr. 6: 152. fig. 76. 1921. Calyx and pedicels more or less densely hispidulous-papillose; otherwise similar to the typical species. Parasitic on various native herbs and shrubs, often forming dense masses, Sonoran Zones; cismontane southern California in San Bernardino and Riverside Counties, California. Type locality: San Bernardino Valley.

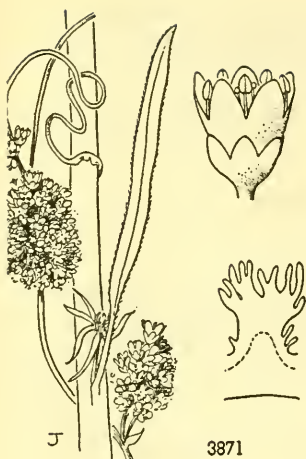
10. *Cuscuta indecòra* var. *neuropétala* (Engelm.) A. S. Hitchcock. Pretty Dodder. Fig. 3880.

Cuscuta neuropetala Engelm. Amer. Journ. Sci. 45: 75. 1843.

Cuscuta pulcherrima Scheele, Linnaea 21: 750. 1848.

Cuscuta indecora neuropetala A. S. Hitchcock, Contr. U.S. Nat. Herb. 3: 549. 1896.

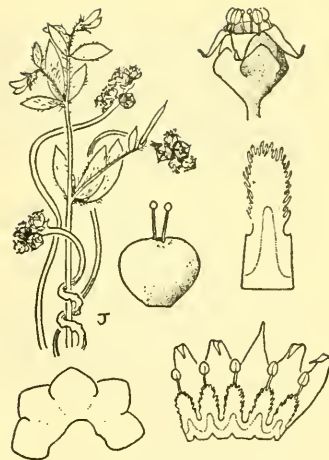
Stems comparatively coarse, yellow. Flowers 3-4 mm. long, on pedicels as long or longer, loosely or compactly clustered, fleshy; calyx shorter than the corolla-tube, lobes triangular-ovate, obtuse or sometimes acutish, glandular; corolla-lobes erect or somewhat spreading, oblong-lanceolate, obtuse, fleshy and glandular along the upper part of midrib and at apex; stamens



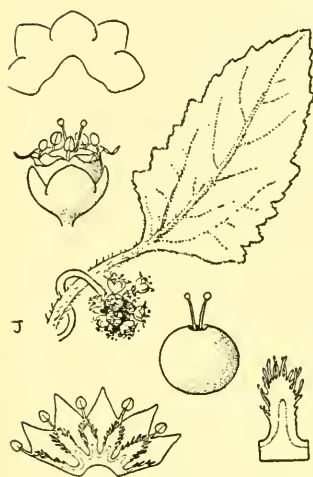
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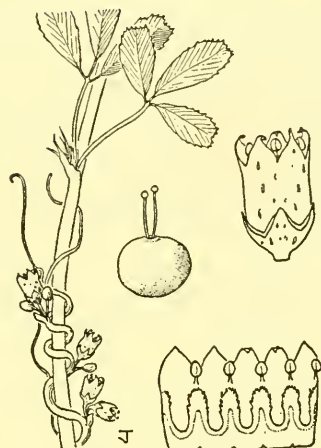
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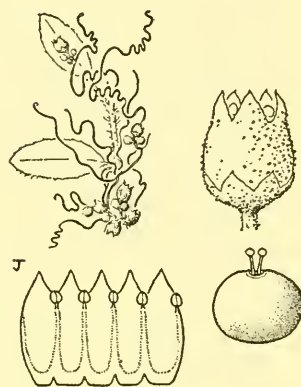
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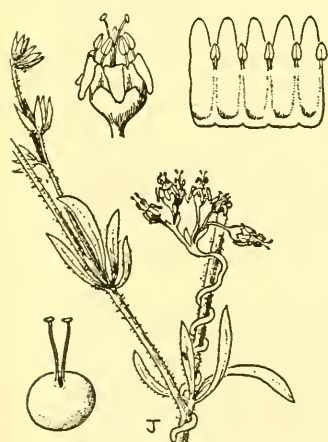
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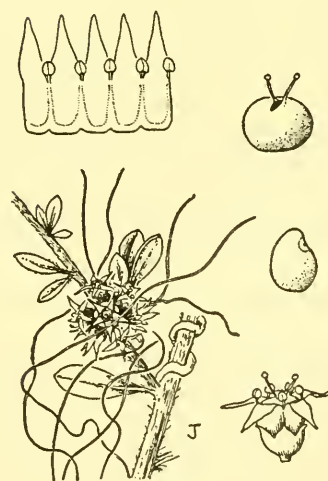
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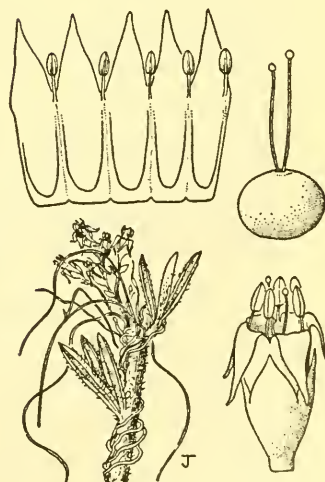
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3871. *Cuscuta Cephalanthii*
 3872. *Cuscuta obtusiflora*
 3873. *Cuscuta pentagona*

3874. *Cuscuta campestris*
 3875. *Cuscuta suaveolens*
 3876. *Cuscuta Jepsonii*

3877. *Cuscuta brachycalyx*
 3878. *Cuscuta occidentalis*
 3879. *Cuscuta californica*

shorter than the lobes; anthers broadly oval, about as long as the filaments; scales equaling or exceeding the corolla-tube, prominently fringed; styles slender, exserted; stigmas capitate; ovary globose but capped by a rather prominent stylopodium; capsule globose, thickened at the top by the stylopodium, surrounded by the withered corolla.

Usually in low moist ground, parasitic on various plants but most frequent on introduced weeds and alfalfa, Sonoran Zones; central and southern California including the deserts, east to Utah and Southern States; Texas south to Mexico, South America, and West Indies. Type locality: "Texas, in wet prairies near Houston." July-Nov.

11. *Cuscuta subinclusa* Dur. & Hilg. Canyon Dodder. Fig. 3881.

Cuscuta Ceanothi Behr, Proc. Calif. Acad. 1: 16. 1854.

Cuscuta subinclusa Dur. & Hilg. Journ. Acad. Phila. II. 3: 42. 1855.

Stems medium coarse, somewhat fleshy. Flowers 5-merous, usually 5-6 mm. long, rarely shorter, sessile or short-pedicelled, in small clusters, these scattered or crowded in large masses; calyx usually about half the length of the corolla, lobes ovate to lanceolate, acute, overlapping below; corolla cylindric, lobes erect or spreading, much shorter than the tube, ovate, acute, the edges crenulate, fringed all around; anthers oblong, sessile or subsessile; styles slender, longer than the ovary, with a collar-like thickening around the intrastylar aperture, capped by the withered corolla.

Parasitic on various native plants especially shrubs and small trees, Sonoran and Transition Zones; southern Oregon on both sides of the Cascade Mountains to Lower California, Mexico. Type locality: Tejon Pass, Tehachapi Mountains, California. June-Oct.

12. *Cuscuta Suksdorfii* Yunker. Alpine Dodder. Fig. 3882.

Cuscuta salina var. *acuminata* Yunker, Univ. Ill. Biol. Monogr. 6: 162. fgs. 32 f-g, 89. 1921.

Cuscuta Suksdorfii Yunker, Mem. Torrey Club 18: 167. fig. 41. 1932.

Stems slender, pale yellow or straw-colored. Flowers short-pedicelled or the pedicels sometimes as long or longer than the flowers, in few-flowered umbellate clusters; calyx-lobes ovate below, attenuate above, the elongated tips extending to the middle of the corolla-lobes; corolla-lobes erect, triangular at base, lanceolate-attenuate above, longer than the short-campanulate tube; stamens much shorter than the lobes, filaments subulate, a little longer than the oval anthers; scales oblong, represented by 2 shallowly dentate wings; stigma capitate; styles much shorter than the broadly conic ovary; capsule ovoid-conic, glandular; seeds 2-4, globose, about 1 mm. in diameter.

Mountain meadows, Boreal Zones; parasitic on various herbs, especially composites; Cascade Mountains, Skamania County, Washington, to the Sierra Nevada, Tulare County, California. Type locality: on an island of a mountain lake, Skamania County, Washington, parasitic on *Aster*. July-Sept.

13. *Cuscuta salina* Engelm. Salt-marsh or Alkali Dodder. Fig. 3883.

Cuscuta salina Engelm. in Bot. Calif. 1: 536. 1876.

Cuscuta californica var. *squamigera* Engelm. Trans. St. Louis Acad. 1: 499. 1859.

Cuscuta squamigera Piper, Contr. U.S. Nat. Herb. 11: 455. 1906.

Cuscuta salina var. *squamigera* Yunker, Univ. Ill. Biol. Monogr. 6: 161. 1921.

Stems reddish orange, slender. Flowers 5-merous, 2-3 mm. long, short-pedicelled, in cymose clusters; calyx-lobes ovate-lanceolate, acute or acuminate, about as long as the campanulate or cylindric corolla-tube; corolla-lobes ovate-lanceolate, about equaling the tube, acute to acuminate, erect or sometimes spreading; scales narrowly oblong, closely attached to the tube almost to the apex, fringed with short processes; anthers oval, equaling or slightly longer than the short subulate filaments; styles slender, shorter than the ovoid ovary; capsule broadly ovoid, pointed at the apex, capped by the withered corolla; seed usually solitary, globose-ovoid.

Parasitic on various saline plants, as *Cressa*, *Frankenia*, *Suaeda*, *Nitrophila*, *Salicornia*, Transition and Sonoran Zones; British Columbia south along the coast to southern California, east to Arizona and southern Utah. Type locality: parasitic on *Suaeda*, saline soil along the Virgin River, Utah. May-Sept.

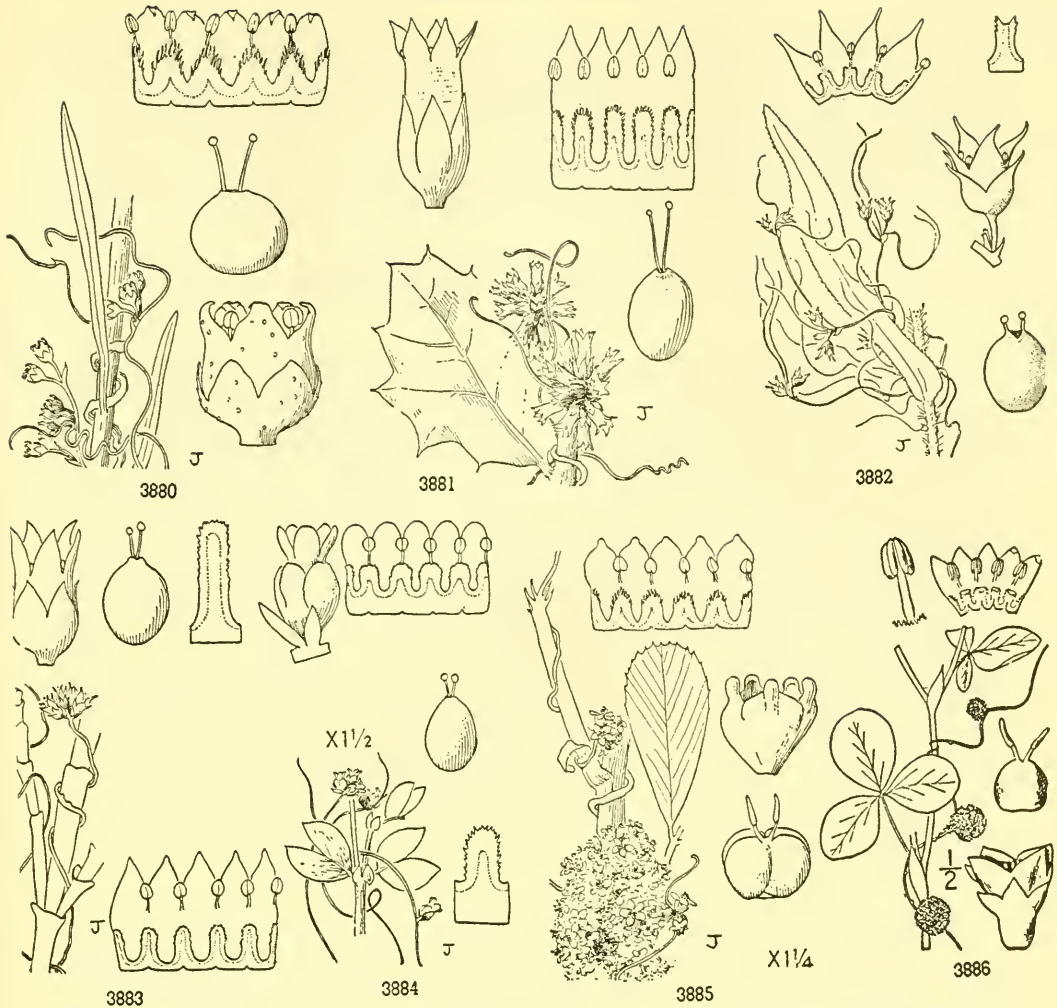
Cuscuta salina var. *majör* Yunker, Univ. Ill. Biol. Monogr. 6: 161. fgs. 32 a-e, 121, 140. 1921. Flowers larger, 3-4.5 mm. long; corolla-lobes broadly ovate, acute, overlapping; scales with fewer teeth on the margins. Common on *Salicornia* along the coast of central California, apparently less so in Oregon, Washington, and southern California. Type locality: Palo Alto, Santa Clara County, California.

14. *Cuscuta denticulata* Engelm. Desert or Toothed Dodder. Fig. 3884.

Cuscuta denticulata Engelm. Amer. Nat. 9: 348. 1875.

Stems very slender, pale yellow. Flowers 2-2.5 mm. long, scattered, either solitary or in few-flowered clusters, short-pedicelled, subtended by 1-3 ovate-lanceolate bracts; calyx-lobes orbicular, concave, overlapping, as long as the corolla-tube and concealing it, denticulate; corolla campanulate, becoming urceolate in age, corolla-lobes oval or ovate, obtuse, about as long as the tube, somewhat spreading; scales broadly oblong, denticulate; anthers oval, about equaling the short filament; styles shorter than the ovoid ovary; stigmas capitate; capsule ovoid, capped by the withered corolla; seeds usually solitary, globose-ovoid.

Parasitic on various desert shrubs, Lower Sonoran Zone; Inyo County and western rim of the Mojave Desert, and northern rim of the Colorado Desert, California, east to Nevada and southern Utah. Type locality: St. George, Utah. June-Oct.



3880. *Cuscuta indecora*
 3881. *Cuscuta subinclusa*
 3882. *Cuscuta Suksdorfii*

3883. *Cuscuta salina*
 3884. *Cuscuta denticulata*

3885. *Cuscuta Epithymum*
 3886. *Cuscuta approximata*

15. *Cuscuta Epithymum* Murr. Thyme Dodder. Fig. 3885.

Cuscuta Epithymum Murr. in L. Syst. ed. 13. 140. 1774.
Cuscuta Trifolii Bab. Phytologia 1: 467. 1843.

Stems filiform, reddish, twining over herbs or low woody plants. Flowers sessile in small dense and rather distinct globose heads, 4-5-merous; calyx-lobes triangular-lanceolate, acute, 0.5 mm. long; corolla pinkish, the tube cylindric or campanulate, exceeding the triangular, spreading lobes; stamens shorter than the lobes; anthers oval, shorter than the filaments; scales somewhat spatulate, fringed on the margin especially on the upper portion; styles including the linear stigmas slightly longer than the ovary; capsule globose, capped by the withered corolla, circumsissile; seeds usually 4, rather rough, compressed.

Parasitic on various plants but chiefly on legumes, such as clover and alfalfa; native of the Old World, but now widespread in North America including the Pacific States. July-Oct.

16. *Cuscuta approximata* var. *urceolata* (Kunze) Yuncker. Small-seeded Alfalfa Dodder. Fig. 3886.

Cuscuta urceolata Kunze, Flora 4: 651. 1846.
Cuscuta cupulata Engelm. Bot. Zeit. 4: 276. 1846.
Cuscuta planiflora var. *approximata* Engelm. Trans. St. Louis Acad. 1: 465. 1859. As to description, but not as to synonymic type.
Cuscuta gracilis Rydb. Bull. Torrey Club 28: 501. 1901.
Cuscuta Anthemi A. Nels. Bot. Gaz. 37: 277. 1904.
Cuscuta approximata var. *urceolata* Yuncker, Mem. Torrey Club 18: 297. 1932.

Flowers in compact globular clusters, sessile, white, 2.5-3 mm. long; calyx-lobes triangular-ovate, well-imbricated, equaling the corolla-tube, thin and reticulate except a fleshy keel ex-

tending into a fleshy turgid apiculation at apex; corolla-tube campanulate in anthesis, urceolate in fruit, scarcely 2 mm. high, the lobes spreading-recurved, usually fleshy at tip; scales oblong, shortly fringed above; stamens shorter than the lobes, anthers oval about equaling the short filaments, often red; stigmas linear, slender, together with the short style longer than the ovary; capsule depressed-globose, enveloped by the withered corolla, circumscissile; seeds usually 4, scarcely 1 mm. long, granulated.

Native of the Old World, but becoming widely distributed in North America, where it is most commonly parasitic on introduced weeds and some legumes, especially alfalfa. Washington, Oregon, and northern California, east to Wyoming, Colorado, and New Mexico. July-October.

Family 128. POLEMONIACEAE.*

PHLOX FAMILY.

Annual or perennial herbs or shrubs or vines. Leaves simple or palmately cleft or pinnately incised, lobed or dissected, or compound, sometimes pungent or entirely bracteate, opposite or alternate. Inflorescence usually a paniculate, glomerate, or flat-topped cyme, or the flowers congested in densely bracteate heads, rarely solitary, with flowers with 5-merous, rarely 4- or 6-merous perianth and androecium, the gynoecium typically 3-merous. Calyx herbaceous to variously membranous or chartaceous, accrescent or sometimes distended or ruptured by the growing capsule; variously cleft to the herbaceous tube (herein called the tube proper), or cleft to the base, the lobes free or more commonly the membranes of their margins coalesced to form a tube of varying length (herein called the pseudotube) superimposed above the tube proper, or the tube proper absent and only the pseudotube present. Corolla sympetalous, campanulate to funnelliform or salverform, the tube from nearly obsolete to 3-6 cm. long; throat usually evident, exceeding or shorter than tube and herein said to be ample when its sides form an angle of more than 60 degrees with one another and narrow when they form an angle of less than 60 degrees. Stamens equally or unequally inserted on the corolla, their filaments equal or unequal. Ovary 3-celled, rarely 2- or 1-celled, style simple, stigma-lobes usually 3, rarely 2, 4, or 1. Fruit a capsule, usually regularly dehiscent, rarely indehiscent. Seeds from 1 to many.

About 15 genera and over 200 species, most abundant in western North America.

Calyx growing with the capsule, becoming chartaceous in age.

Calyx green-herbaceous throughout, the sinuses not distended; leaves pinnately compound, the leaflets lanceolate; locules of the capsule campanulately spreading, not folded. 1. *Polemonium*.

Calyx often white-chartaceous below; the sinuses replicate or distended as the lip of a pitcher; leaves entire, lobed, parted, or bipinnately dissected; locules of the capsule campanulately spreading on dehiscence, their margins folded back on the midvein. 2. *Collomia*.

Calyx distended and often bursting by the growth of the capsule, commonly with a membranous pseudotube formed by the coalescence of the membranes flanking the sepals.

Leaves all involucrel or bracteate, connate or perfoliate at the base, true foliage leaves absent; cotyledons persistent; capsule-valves membranous, disarticulating on dehiscence; diminutive annuals. 3. *Gymnosteris*.

Leaves either cauline or basal or both, sometimes also bracteate.

Leaves opposite, sometimes those in the inflorescence alternate.

Leaves entire; corollas strictly salverform; stamens unequally inserted; capsule-valves completely disarticulating on dehiscence. 4. *Phlox*.

Leaves chiefly palmately cleft, rarely entire, then linear-filiform; corollas campanulate to funnelliform or salverform then with a short throat; stamens equally inserted; capsule-valves persistent below after dehiscence, campanulately spreading. 5. *Linanthus*.

Leaves alternate, rarely those at the extreme base of the plant opposite.

Calyx-lobes unequal, the flowers in dense bracteate heads.

Plants arachnoid-woolly, the hairs completely interlaced to form a compact felt-like mass over at least the inflorescence; capsules dehiscent from the top; leaves and bracts rarely with rigid spinose lobes. 6. *Eriastrum*.

Plants glandular to glabrous or occasionally villous, the hairs though sometimes shaggy never interlaced in a felt-like mat; capsules dehiscent from below upward, or indehiscent, rarely dehiscent above; leaves and bracts usually with rigid spinose lobes. 7. *Navarretia*.

Calyx-lobes equal, flower solitary, in glomerules or in heads.

Corolla markedly 2-lipped or the petals at least somewhat unequal.

Annuals, the leaves with their lobes setose or spine-tipped. 8. *Langloisia*.

Perennials, the corolla scarlet, leaves in ours neither setose nor spine-tipped. 9. *Loeselia*.

Corolla regular.

Leaves spinose or linear-acerose-lobed, palmately to subpinnately parted, densely fascicled; perennial shrubs or subshrubs. 10. *Leptodactylon*.

Leaves not spinose, pinnately lobed, divided or dissected, sometimes entire, rarely the teeth setose or spine-tipped; biennials, annuals, or very short-lived perennials. 11. *Gilia*.

* Text, except for the genus *Polemonium* and the genus *Gilia* written jointly with Alva Day Grant, contributed by Herbert Louis Mason.

1. **POLEMONIUM*** [Tourn.] L. Sp. Pl. 162. 1753.

Erect, spreading, decumbent or rhizomatous annuals or perennials. Stems simple or branched. Leaves pinnately divided, the leaflets entire to palmately 3-5-parted, narrowly linear to rotund. Flowers in terminal or axillary cymes, solitary to capitately congested, or in a sympodial raceme. Calyx herbaceous throughout, accrescent, campanulate, the lobes deltoid to acuminate. Corolla rotate-campanulate to narrowly funnelform, with no sharp distinction between tube and throat; lobes spatulate to rotund, white, yellow, pink, purple, or blue. Stamens equally inserted on the tube, the level of insertion varying between some species, filaments of equal length, included or exserted. Pistil included or exserted. Capsule ovoid, each locule from 1-10-seeded, seeds sometimes becoming mucilaginous when moistened. Embryo orthotropic. [Named for Polemon, a Greek philosopher.]

A genus of about 25 species, natives of the north temperate regions of both hemispheres, the greatest diversity occurring in the mountains of western North America; also the mountains of South America. Type species, *Polemonium coeruleum* L.

Annual; corolla equaling or shorter than the calyx; inflorescence racemose.
Perennial; corolla exceeding the calyx; inflorescence cymose.

1. *P. micranthum*.

Corolla-lobes equal to, or exceeding the tube, flowers in open cymes.

2. *P. pectinatum*.

Leaflets narrowly linear.

Leaflets elliptic to rotund.

Plants over 3 dm. tall, erect to decumbent; stems greatly exceeding the lower stem-leaves.
Stems decumbent; corolla over 15 mm. long; flowers yellow to purplish.

3. *P. carneum*.

Stems erect; corolla less than 15 mm. long; flowers blue.

4. *P. occidentale*.

Plants under 3 dm. tall, caespitose; stems equaling or at most twice the lower stem-leaves.

Corolla-lobes twice the tube-length; calyx-lobes usually 1.5 times tube-length; terminal leaflets confluent.

5. *P. californicum*.

Corolla-lobes subequaling the tube; calyx-lobes subequaling the tube; terminal leaflets discrete.

6. *P. pulcherrimum*.

Corolla-lobes shorter than the tube; flowers in capitate, congested cymes.

Stamens shorter than the corolla.

Leaflets entire, or occasionally slightly lobed.

7. *P. elegans*.

Leaflets deeply 3-5-cleft, appearing verticillate.

Calyx-segments rounded at the apex; inflorescence a subcapitate head in fruit.

8. *P. eximium*.

Calyx-segments sharply acute at apex; inflorescence a spicate raceme in fruit.

9. *P. viscosum*.

Stamens exceeding the corolla.

10. *P. chartaceum*.1. **Polemonium micranthum** Benth. Annual Polemonium. Fig. 3887.

Polemonium micranthum Benth. in A. DC. Prod. 9: 318. 1845.

Polemoniella micrantha Heller, Muhlenbergia 1: 57. 1904.

Annual, 3-25 cm. high, stems solitary to caespitose, slender, about twice the length of the lower leaves, glabrate to pilose with glandular hairs. Leaflets 3-7 pairs, narrowly elliptical to spatulate, 1-6 mm. long, 0.5-2 mm. wide, glandular-pubescent; inflorescence a sympodial raceme, each flower produced terminally on a shoot bearing one leaf, and each succeeding flower-shoot developing in turn from the axil of the uppermost leaf, the subtending leaves similar to reduced foliage leaves in shape and pubescence; flowers solitary to many; pedicels to 13 mm. long, exceeding the calyx; calyx campanulate, 3-7 mm. long, the lobes commonly 1.5 times the length of the tube, the whole glandular-pubescent; corolla shorter than the calyx, 2-6 mm. long, broadly campanulate, with the rotund lobes equaling the tube, white; stamens inserted half way up the tube, shorter than the corolla, filament-bases pubescent; ovary and style together subequaling the corolla.

Fields, plains, and hillsides, 2,000 to 5,000 feet altitude, Upper Sonoran and Arid Transition Zones; mainly east of the Cascades, British Columbia to northeastern California (with an isolated station on Mount Pinos, southern California), east to Idaho and Utah. Type locality: Columbia River. Collected by Douglas. April-May.

2. **Polemonium pectinatum** Greene. Washington Polemonium. Fig. 3888.

Polemonium pectinatum Greene, Bull. Calif. Acad. 1: 10. 1884.

Perennial, 3-7.5 dm. high, stems stout, terete, erect and clustered, glabrous. Leaflets 5-10 pairs, linear-filiform, to 30 mm. long, glabrous; inflorescence a cyme, pedicels 4-10 mm. long, subequaling the calyx; bracts foliaceous; calyx narrowly campanulate, 4-10 mm. long, lobes slightly exceeding the tube, glandular-pubescent; corolla rotate-campanulate, to 20 mm. broad, white to cream in color, the obovate lobes 3 times the length of the tube; stamens inserted two-thirds of the way up the tube, subequaling the corolla in length, pubescent at base; ovary and style subequaling the corolla.

Known only from damp ground in the Rock Lake area, Whitman County, Washington. Type locality: "eastern part of Washington Territory." May-June.

* Text contributed by John Fraser Davidson.

3. *Polemonium carneum* A. Gray. Great Polemonium. Fig. 3889.

Polemonium carneum A. Gray, Syn. Fl. N. Amer. 2: 151. 1878.

Perennial, 4–8 dm. high, branching from the base, decumbent in age, stems stoutish, 3–5 mm. in diameter, microscopically pubescent with round-tipped hairs. Leaflets 6–10 pairs, ovate to oblong-lanceolate, to 4 cm. in length, the terminal 3 leaflets often confluent; inflorescence a cyme, pedicels 2–10 mm. long; calyx 7–18 mm. long, the lobes slightly exceeding the tube, finely pubescent with round-tipped nonglandular hairs; corolla rotate-campanulate, 10–25 mm. broad, about the same in length, salmon or flesh-colored, ageing purple, the lobes broad, rounded to obovate, slightly longer than the tube; stamens inserted slightly below the middle of the tube, 2–5 mm. from the base, subequaling the corolla, filaments slender, pubescent at the base; ovary and style exceeding the corolla, style exerted in bud.

Moist soil, 50 to 3,000 feet altitude, Transition Zone; Siskiyou region of southern Oregon and northern California, south in the Coast Ranges to San Mateo County. Type locality: Siskiyou County, California. May–Sept.

Polemonium carneum subsp. *luteum* (A. Gray) Brand, Pflanzenreich 4250: 41. 1907. (*Polemonium carneum* var. *luteum* A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 412. 1886; *P. luteum* Howell, Fl. N.W. Amer. 463. 1901.) Characteristics of the species, but corolla yellow. Range scattered throughout Oregon and Washington, intergrading with the typical species in southern Oregon. Type locality: "Cascade Mountains, Oregon."

4. *Polemonium occidentale* Greene. Western Polemonium. Fig. 3890.

Polemonium occidentale Greene, Pittonia 2: 75. 1890.

Polemonium caeruleum of western authors, not L.

Perennial, 3–9 dm. high, stems slender, solitary, erect, from a decumbent base or horizontal rootstock, glabrous to finely pubescent. Leaflets 7–13 pairs, ovate-lanceolate, acute at apex, rotund and oblique at base, upper 3 leaflets often confluent, 1–3 cm. long, 2–8 mm. broad, glabrous; inflorescence a cyme; bracts entire to pinnatifid, 2–7 mm. long, glandular-pubescent; pedicels short, subequaling the calyx; calyx 4–10 mm. long, the lobes subequaling the tube, or commonly slightly longer, glandular-pubescent; corolla rotate-campanulate, 1.5–2 cm. broad, the blue, broadly ovate lobes slightly exceeding the tube; stamens inserted half way up the corolla-tube, equaling the corolla in length, filaments pubescent at the base; ovary and style conspicuously longer than the corolla, often exceeding it by 5 mm.

In wet places, 2,000 to 10,000 feet altitude, Transition and Boreal Zones; British Columbia to southern California, east to Colorado. Type locality: Rocky Mountains of Colorado. June–Sept.

Polemonium Héleri Brand, Pflanzenreich 4250: 32. 1907. Flowers smaller, 10 mm. long; anthers subsessile on very short filaments. Recorded only from the type locality, Truckee, Nevada County, California.

5. *Polemonium californicum* Eastw. Low Polemonium. Fig. 3891.

Polemonium californicum Eastw. Bot. Gaz. 37: 437. 1904.

Polemonium calycinum Eastw. op. cit. 438.

Polemonium tricolor Eastw. op. cit. 439.

Polemonium Tevisii Eastw. op. cit. 440.

Polemonium columbianum Rydb. Bull. Torrey Club 40: 477. 1913.

Perennial from a slender horizontal rootstock, 1–2 (occasionally 3) dm. high, stems solitary to subcespitose, glandular-pubescent. Leaflets 5–11 pairs, ovate, lanceolate, or oblong, mostly acute, the upper 3 commonly confluent, 3–20 mm. long, 1–8 mm. broad, thin, from glabrous to glandular-pilose; inflorescence a cyme; bracts entire to pinnatifid, glandular-pubescent; flowers many, on slender pedicels subequaling the calyx; calyx narrowly campanulate, 5–8 mm. long, the lobes twice, or at least one and one-half times the length of the tube, glandular-pubescent; corolla rotate-campanulate, 8–15 mm. broad, the lobes twice as long as the tube, blue; stamens inserted half way up the tube, pubescent at the base, subequaling the corolla; ovary and style exceeding the corolla by the length of the stigmas.

Alpine valleys and flats, in granitic soils, Boreal Zones; Olympic Mountains, Washington, and the Cascades, southern British Columbia, south to the Sierra Nevada, California, and east to Idaho. Type locality: Snow Flat, on the old Tioga Road, Yosemite National Park. June–Aug.

6. *Polemonium pulcherrimum* Hook. Showy Polemonium. Fig. 3892.

Polemonium pulcherrimum Hook. Bot. Mag. 57: pl. 2979. 1830.

Polemonium Berryi Eastw. Bot. Gaz. 37: 440. 1904.

Polemonium montrosensis A. Nels. Proc. Biol. Soc. Wash. 18: 174. 1905.

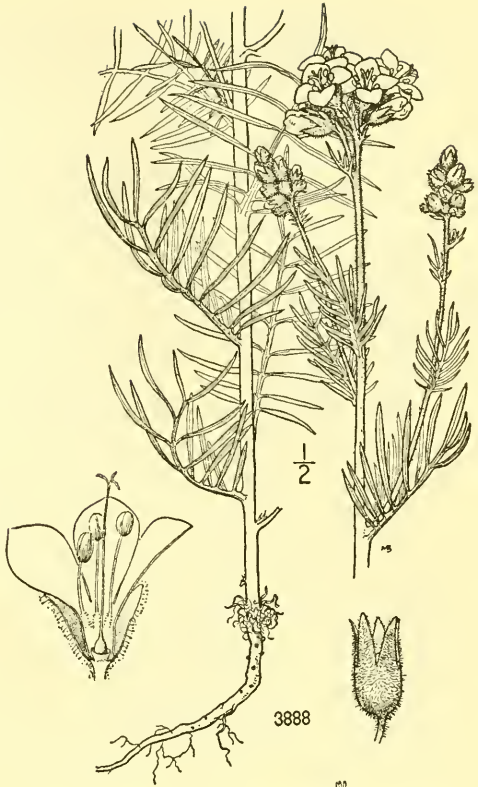
Perennial, 1–3 dm. high, erect, becoming caespitose in age, glabrous. Leaflets 5–11 pairs, ovate to rotund, obtuse, entire, 2–8 mm. long, 1–5 mm. broad, sparsely pubescent with scattered short glandular hairs, the upper leaflets discrete; inflorescence a cyme, pedicels long, slender, exceeding the calyx; bracts entire to pinnatifid, up to 7 mm. long; calyx campanulate, 4–6 mm. long, lobes equaling the tube, glandular-pubescent; corolla rotate-campanulate, 5–8 mm. long, the same in breadth, the blue, ovate, obtuse lobes subequaling the yellowish tube; stamens inserted below the middle of the tube, subequaling the corolla, bases pubescent; ovary and style subequaling the corolla.

Usually in volcanic soils, Boreal Zones; Aleutian Islands, Alaska, Yukon, and British Columbia, south in the Pacific States to the southern Sierra Nevada, California, and in the Rocky Mountains to Colorado. Type locality: "highest of the Rocky Mountains," in southern British Columbia. June–Aug.

Polemonium pulcherrimum var. *pilosum* (Greenm.) J. F. Davidson. (*Polemonium viscosum* var. *pilosum* Greenm. Bot. Gaz. 25: 263. 1898; *P. shastense* Eastw. Bull. Torrey Club 32: 205. 1905.) Perennial, densely caespitose from a stout rootstock, 6–10 (occasionally 15) cm. high, glandular-pubescent. Leaflets crowded, rotund



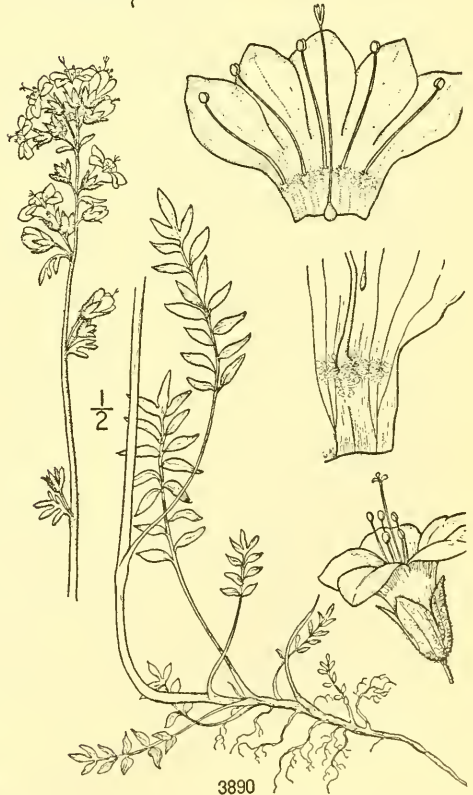
3887



3888



3889



3890

3887. *Polemonium micranthum*
3888. *Polemonium pectinatum*

3889. *Polemonium carneum*

3890. *Polemonium occidentale*

to broadly elliptical, 1–5 mm. long, glandular-pubescent; inflorescence a compact cyme; pedicels variable, but commonly shorter than the calyx; bracts entire to pinnatifid, glandular-pubescent; calyx campanulate, 4–8 mm. long, the lobes equaling the tube, glandular-pubescent; corolla campanulate to rotate-campanulate, 8–11 mm. long, almost as broad, the rotund, obtuse, blue lobes subequaling the yellow tube; stamens inserted half way up the tube, pubescent at the base, equaling or slightly exceeding the corolla; ovary and style shorter than the corolla. Cascade and Olympic Ranges, from 5,000 to 9,500 feet altitude. Type locality: Goat Mountain, Washington.

7. *Polemonium elegans* Greene. Elegant Polemonium. Fig. 3893.

Polemonium elegans Greene, Pittonia 3: 305. April 8, 1898.

Polemonium bicolor Greenm. Bot. Gaz. 25: 262. April 15, 1898.

Perennial, dwarf, caespitose, 5–12 cm. high, the basal leaves half as high, densely glandular-pubescent. Leaflets crowded, obovate to rotund, rarely lobed, and then the sinuses not to the base, 2–4 mm. long; inflorescence a subcapitate cyme; pedicels shorter than the calyx; bracts pinnatifid, glandular-pubescent; calyx narrowly campanulate, 5 mm. long, the lobes slightly shorter than the tube, densely glandular-pubescent; corolla funnelform, to 14 mm. long, the obovate, blue lobes rounded at the apex, half as long as the yellow tube; stamens inserted half way up the tube; filaments pubescent at base, shorter than the corolla; ovary and style shorter than the corolla.

Mountain slopes, 7,000 to 9,000 feet altitude, Arctic-Alpine Zone; Cascade and Wallowa Mountains, Washington and Oregon. Type locality: Mount Rainier, Washington. July–Aug.

8. *Polemonium eximium* Greene. Sierra Polemonium or Sky-Pilot. Fig. 3894.

Polemonium eximium Greene, Pittonia 3: 305. 1898.

Polemonium confertum var. *eximium* Jepson, Man. Fl. Pl. Calif. 783. 1925.

Perennial, 10–27 cm. high, caespitose from a woody caudex. Leaves mostly basal, few on the floriferous branches; petioles expanded at the base, but not chartaceous, rachis rigid in age; leaflets small, 3–5-parted, from 0.5–5 mm. long, the lobes spatulate to oblanceolate, glandular-ciliate; inflorescence subcapitate in flower, also in fruit; pedicels shorter than the calyx; bracts lobed to entire; calyx narrowly campanulate, 5–10 mm. long, lobes slightly shorter than the tube, narrowly elliptical, rounded at apex, densely glandular-pubescent; corolla narrowly funnelform to cylindrical, with rotate limbs, 12–15 mm. long, 10–15 mm. broad, the blue spreading rounded lobes from one-third to one-half the length of the tube; stamens inserted one-quarter the way up the tube, pubescent at the base, slightly exceeding the tube but shorter than the corolla; ovary and style shorter than the corolla.

Rocky ledges, Hudsonian and Arctic-Alpine Zones; high peaks of the Sierra Nevada from Mount Conness, Tuolumne County to Mount Whitney, Tulare County, California. Type locality: Mount Conness, altitude 12,000 feet. June–July.

9. *Polemonium viscosum* Nutt. Skunk Polemonium. Fig. 3895.

Polemonium viscosum Nutt. Journ. Acad. Phila. II. 1: 154. 1848.

Polemonium confertum A. Gray, Proc. Acad. Phila. 15: 73. 1863.

Perennial, 1–5 dm. high from a persistent rhizome. Leaves mostly basal, few on the floriferous branches, petioles expanded at the base, chartaceous, the rachis rigid and persistent in age; leaflets 3–5-parted appearing verticillate, the lobes elliptic, 1–10 mm. long and 0.5–4 mm. wide, glandular-ciliate to glabrous on the margin; inflorescence subcapitate at anthesis, becoming a spicate raceme in fruit; pedicels shorter than the calyx; bracts pinnatifid; calyx narrowly campanulate, 8–16 mm. long, the lobes one-third the length of the tube, lanceolate, acute, densely glandular-pubescent; corolla narrowly funnelform with subrotate limbs, 17–35 mm. long, 10–20 mm. broad, blue or occasionally white, the rotund lobes about one-third the length of the tube; stamens inserted half way up the tube, pubescent to glabrous at the base, slightly exceeding the tube, but shorter than the corolla.

Rocky ledges, Arctic-Alpine Zone; Cascade and Rocky Mountains, British Columbia, south to the Cascades, Washington, and to the Wallowa Mountains, northeastern Oregon, and in the Rocky Mountains to Idaho, Utah, and Colorado. Type locality: "towards the sources of the Platte." June–Aug.

10. *Polemonium chartaceum* H. L. Mason. Mason's Polemonium. Fig. 3896.

Polemonium chartaceum H. L. Mason in Jepson, Man. Fl. Pl. Calif. 783. 1925.

Perennial, 10–30 cm. high, from a woody caudex, stems several, erect, caespitose, leafy; petioles with a broad sheathing chartaceous base, rachis not rigid in age. Leaflets small, 3–5-lobed, the lobes spatulate, 0.5–3 mm. long, glandular-pubescent; inflorescence subcapitate, pedicels about half the length of the calyx; bracts pinnatifid, glandular-pubescent; calyx narrowly campanulate, 6–8 mm. long, the rounded obtuse lobes shorter than the tube, glandular-pubescent; corolla funnelform, lobes rotate, 11–13 mm. long, about as broad, the rounded, obtuse, blue lobes one-third the length of the white tube; stamens inserted one-quarter of the way up the tube, pubescent at the base, subequaling the corolla, much exceeding (4 mm.) the tube; ovary and style subequaling the stamens.

Rocky ledges, Hudsonian and Arctic-Alpine Zones; Mount Eddy, altitude 6,000 feet, Siskiyou County, and White Mountain Peak, altitude 14,000 feet, Mono County, California. Type locality: White Mountain Peak, 14,230 feet. June–Aug.

2. COLLÒMIA Nutt. Gen. 1: 126. 1818.

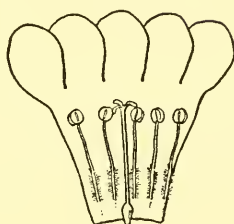
Erect, spreading, decumbent, prostrate or rhizomatous annuals or perennials. Stems simple or branched. Leaves linear or lanceolate and entire or variously lobed, toothed or



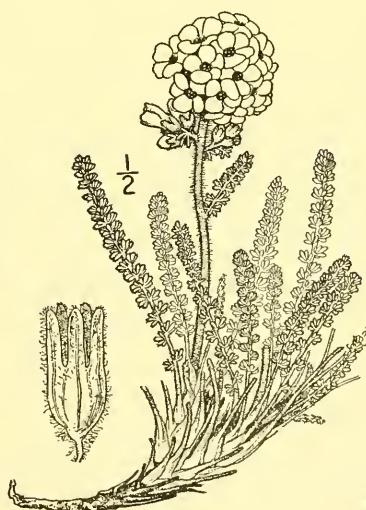
3891



3892



3893



3894



3895

3891. *Polemonium californicum*
3892. *Polemonium pulcherrimum*

3893. *Polemonium elegans*
3894. *Polemonium eximium*

3895. *Polemonium viscosum*

dissected. Flowers in cymes either on the ends of branches and in the forks of the cyme, or capitate congested, rarely solitary in the leaf-axils. Calyx wholly herbaceous or rarely with a chartaceous membrane-like area below the sinuses, obconic or campanulate, accrescent, the sinuses of the lobes distended as the lip of a pitcher, or replicate, lobes triangular to acicular-attenuate. Corolla trumpet-shaped or narrowly funnelform, the tube gradually expanding upward toward the limb often without a clear differentiation between tube and throat, never truly salverform, lobes spatulate or lanceolate. Stamens equally or unequally inserted on the throat or sometimes on the tube or at times some on throat and some on tube, filaments equal or unequal in length. Pistil included or exserted. Capsule ellipsoid to obovoid, the locules with 1-2 or sometimes 3 seeds, campanulately spreading on dehiscence, margins of each folded back on their midvein. Seeds developing mucilage or spiracles when wetted or not so affected. [Name Greek, meaning mucilage, because of the mucilaginous exudate from the wetted seeds of some of the species.]

About 15 species, Alaska to Lower California and mountains of Bolivia to Patagonia. Type species, *Collomia linearis* Nutt.

Plants annual.

Leaves linear or lanceolate, entire; seeds 1 to each locule.

Stems simple below, divaricately or cymosely branched above.

Stamens unequally inserted.

Filaments equal, 1 mm. or less long; calyx-lobes unequal, the longer subequal to the corolla; bracts much exceeding the flowers; corolla 1 cm. or less long; Gilliam County, Oregon.
1. *C. macrocalyx*.

Filaments very unequal, the longest about 1 cm. long; calyx-lobes equal; corolla 2-3 times the calyx, equal or longer than the upper leaves and bracts, 2-3 cm. long; Humboldt and Trinity Counties, California.
2. *C. Tracyi*.

Stamens equally inserted on the throat of corolla.

Flowers 2 to several in a cluster; stamens inserted at top of throat, 1 or 2 sessile or subsessile, the rest with long filaments.
3. *C. tinctoria*.

Flowers solitary or rarely 2 in the leaf-axils; stamens inserted at base of throat; anthers all with long filaments, subequal or unequal in length.
4. *C. tenella*.

Stems simple and erect usually throughout, occasionally 1 or more from base, occasionally branched; flowers in terminal heads and sometimes with stalked heads of flowers in upper leaf-axils.

Corolla 5-15 mm. long, about twice as long as the calyx, pink or white.
5. *C. linearis*.

Corolla 20-25 mm. long, 3-4 times the length of the calyx, salmon-yellow with blue anthers.
6. *C. grandiflora*.

Leaves lobed, toothed, or dissected, if entire the blade elliptic; seeds 2-3 to each locule.

Leaves variously lobed or incised to pinnately dissected, blades thin; flowers pink; filaments of stamens unequal.
7. *C. heterophylla*.

Leaves 3-toothed at summit or entire, blades thick; flowers blue to purple with yellow throat; filaments of stamens equal.
8. *C. diversifolia*.

Plants perennial.

Leaves thick, entire, toothed or dissected, rarely over 2 cm. long; plants usually tufted alpine or subalpine.

Leaves simple, toothed, incised or lobed, blade usually elliptic in outline.
9. *C. debilis*.

Leaves twice or thrice digitately dissected, usually reniform or orbicular in outline; volcanic peaks.
10. *C. Larsenii*.

Leaves thin, blade elliptic, 3-5 cm. long, coarsely serrate above, entire below.

Corolla blue, 10-12 mm. long; plants from a slender taproot; Mount Mazama and Mount McLoughlin, Oregon.
11. *C. mazama*.

Corolla orange-red and yellow; plants from an elaborate system of rhizomes; Madera County, California.
12. *C. Rawsoniana*.

1. *Collomia macrocalyx* Leiberg. Bristle-flowered *Collomia*. Fig. 3897.

Collomia macrocalyx Leiberg ex Brand, Rep. Spec. Nov. 17: 317. 1921.

Erect annual 5-10 cm. high; stems divergently branched; cotyledons orbicular, on slender petioles. Lower leaves petioled with elliptic blades, upper linear-lanceolate, 15-35 mm. long, subsessile, puberulent; flowers sessile or subsessile in densely bracteate cymes; bracts leafy, linear-oblancheolate, much exceeding the flowers and longer than cauline leaves; calyx 8-10 mm. long, lobes unequally attenuate, the longer subequal to the corolla, canescently puberulent; corolla narrowly funnelform, 8-10 mm. long, the tube appearing as though dilated upward, corolla purplish (when dry); stamens unequally inserted in throat; filaments less than 1 mm. long, about equal, included; stigma included; capsule about equal to the calyx-tube, locules each 1-seeded.

Known only from near Lonerock and the forks of Cottonwood Canyon, Gilliam County, Oregon. Type locality: near Lonerock. June.

2. *Collomia Tracyi* H. L. Mason. Tracy's *Collomia*. Fig. 3898.

Collomia tinctoria subvar. *luxuriosa* Brand, Rep. Spec. Nov. 17: 317. 1921.

Collomia Tracyi H. L. Mason, Madroño 9: 253. 1948.

Erect or spreading annual, 5-20 cm. high; stems forked, glandular. Leaves linear to lanceolate, tapered at both ends, petioled or subsessile, 2-6 cm. long, those in the inflorescence barely exceeding the flowers; flowers in clusters of 2-5, terminal on the branches or in the axils of the leaves and forks of the branches, clusters subtended by few leafy bracts; calyx-lobes lanceolate-attenuate, minutely glandular; corolla 15-25 mm. long, 3 times the calyx, subequal to slightly exceeding the leaves of inflorescence, limb about 1 cm. broad, white to pink, tube sometimes purple; stamens very unequally inserted, lowermost well down the corolla-tube and often

subsessile, the upper on the throat and with long glabrous filaments; stigma included; capsule obovoid; seeds solitary in the locules.

Mountains in the drainage basin of the Van Duzen and Mad Rivers, 1,000 to 6,800 feet altitude, Humboldt and Trinity Counties, California. Type locality: "Three forks of Mad River, Trinity Co." June-July.

3. *Collomia tinctoria* Kell. Yellow-staining *Collomia*. Fig. 3899.

Collomia tinctoria Kell. Proc. Calif. Acad. 3: 17. 1863.

Collomia linearis var. *subulata* A. Gray, Proc. Amer. Acad. 8: 259. 1870.

Gilia linearis var. *subulata* A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 408. 1886.

Gilia aristella A. Gray, loc. cit.

Gilia tinctoria Curran, Bull. Calif. Acad. 1: 142. 1889.

Collomia aristella Rydb. Mem. N.Y. Bot. Gard. 1: 318. 1900.

Collomia tinctoria var. *subulata* Brand, Pflanzenreich 4²⁵⁰: 52. 1907.

Gilia Elmeri Piper ex Brand, loc. cit., as a synonym.

Erect or spreading, cymosely forked annuals, 4-10 cm. high; herbage villous to glandular-viscid; cotyledons oblanceolate, petioled. Leaves entire, linear to linear-lanceolate, mostly tapering at both ends, either sessile or with an evident petiole, much surpassing the flowers; flowers solitary, or in clusters of 2-3 in the axils of leaves or in the forks of the cyme, those at ends of branches somewhat capitate-congested; calyx campanulate, lobes triangular-aristate, minutely glandular; corolla filiform, 8-12 mm. long, 2 times calyx, limb 4-6 mm. broad, pink, tube sometimes purple, glabrous; stamens equally or subequally inserted at top of throat; filaments very unequal, 1 or 2 exserted, the rest included; stigma barely exserted; capsule obovoid, locules 1-seeded.

Sierra Nevada from Mariposa County and Coast Ranges from Lake County north through eastern Oregon to the Wallowa Mountains, east to Nevada; 5,000 to 12,000 feet. Type locality: "western slope of the Sierra Nevada Mountains." June-July.

4. *Collomia tenella* A. Gray. Diffuse *Collomia*. Fig. 3900.

Collomia tenella A. Gray, Proc. Amer. Acad. 8: 259. 1870.

Gilia leptotes A. Gray, Proc. Amer. Acad. 17: 233. 1882.

Navarretia leptotes Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Gilia tenella Nels. & Macbr. Bot. Gaz. 61: 34. 1916. Not *G. tenella* Benth.

Erect annual 1-2 dm. high, stems diffusely branched, glandular-villous to glabrate, cotyledons oblong-spatulate, petiole subequal to the blade. Leaves linear-lanceolate, entire, tapered on both ends, often long-petioled or sometimes subsessile, 2-5 cm. long, glandular-ciliate, often with black capitate glands; flowers sessile or on a short pedicel, solitary or rarely in pairs in the axils of the leaves and forks of the branches, terminal flower of branch immediately subtended by a leaf; calyx obconic to broadly campanulate, in anthesis 3-4 mm. long, growing with the capsule, lobes lanceolate to triangular-acuminate; corolla very narrowly funnelform, 4-6 mm. long, limb 3-4 mm. wide, purplish to pink or white; stamens equally inserted on the base of throat, filaments equal or unequal, longer than throat, exserted; capsule shorter than calyx, locules 1-seeded.

Eastern Oregon and Washington to Idaho, Utah, and Nevada. Type locality: "Nevada, [Utah] in Wasatch Mountains about Parley's Park." June-July.

5. *Collomia linearis* Nutt. Narrow-leaved *Collomia*. Fig. 3901.

Collomia linearis Nutt. Gen. 1: 126. 1818.

Hoitzia linearis Spreng. Syst. 1: 626. 1825.

Collomia parviflora Hook. Bot. Mag. 56: pl. 2893. 1829.

Gilia linearis A. Gray, Proc. Amer. Acad. 17: 223. 1882.

Navarretia linearis Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Collomia lanceolata Greene ex Brand, Pflanzenreich 4²⁵⁰: 49, as a synonym. 1907.

Collomia linearis var. *humilis* Brand, loc. cit.

Erect annual 1-6 dm. high; stems simple or less commonly branched, puberulent to sometimes glandular in inflorescence; cotyledons spatulate to obovate or orbicular, sessile or short-petioled. Leaves alternate, linear to lanceolate, tapering to base but not petioled, tip acute or sometimes on the lower leaves broad and rounded; flowers sessile in bracteate heads, terminal on branches and sometimes also in the upper axils; bracts foliaceous, linear to ovate-attenuate; calyx campanulate, 4-7 mm. long, tube thin, glandular-pilose to glabrate, lobes triangular-attenuate, glandular-villous to glabrate, becoming chartaceous in age as it grows with capsule; corolla linear-funnelform, with slight differentiation of throat and tube, pubescent or glabrous, 8-15 mm. long, pink; stamens unequally inserted, included, filaments subequal, about 1 mm. long; pistil about two-thirds as long as corolla, included, stigma-lobes about 1 mm. long; capsule ellipsoid, seeds 1 to each locule.

Alaska south through British Columbia, Washington, and Oregon east of the Cascade Mountains, to the Sierra Nevada and San Bernardino Mountains, California, east to Arizona, Manitoba, Minnesota, and Nebraska; also Quebec and New Brunswick. Type locality: "Near the banks of the Missouri about the confluence of Shian River." May-Aug.



3896. *Polemonium chartaceum*
3897. *Collomia macrocalyx*

3898. *Collomia Tracyi*
3899. *Collomia tinctoria*

3900. *Collomia tenella*
3901. *Collomia linearis*

6. *Collomia grandiflora* Dougl. Large-flowered *Collomia*. Fig. 3902.

- Collomia grandiflora* Dougl. ex Hook. Bot. Reg. 14: pl. 1174. 1828.
Collomia grandiflora var. *tenuiflora* Benth. in A. DC. Prod. 9: 308. 1845.
Collomia grandiflora var. *cryptantha* Regel ex A. Gray, Proc. Amer. Acad. 8: 259. 1870.
Gilia grandiflora A. Gray, op. cit. 17: 223. 1882.
Navarretia grandiflora Kuntze, Rev. Gen. Pl. 2: 433. 1891.
Gilia grandiflora var. *diffusa* Mulford, Bot. Gaz. 19: 120. 1894.
Collomia grandiflora var. *diffusa* Piper, Contr. U.S. Nat. Herb. 11: 465. 1906.
Collomia scabra Greene, Leaflets Bot. Obs. 2: 88. 1910.
Collomia grandiflora var. *axillaris* A. Nels. Bot. Gaz. 52: 270. 1911.
Gilia grandiflora var. *axillaris* Nels. & Macbr. Contr. Gray Herb. No. 56:57. 1918.

Erect often coarse annual, 1–10 dm. high; stems simple or branched from the base, less commonly branched above. Leaves lanceolate to occasionally elliptic, entire, sessile, 5–10 cm. long, glabrous to puberulent or glandular to scabrous; flowers sessile in terminal and sometimes axillary heads; bracts foliaceous, lanceolate-ovate; calyx obconic, becoming chartaceous, lobes lanceolate; corolla narrowly funnelform to subsalverform, tube 2–3 times the calyx, not clearly differentiated from throat, appearing as though dilated upward, salmon-yellow to cream or nearly white; lobes lanceolate, rotately spreading; stamens unequally inserted on throat or lowermost on tube, unequal in length, anthers blue, those of longer stamens exserted; stigma included; capsule obovoid; seeds solitary in the locules.

Higher mountains of southern California from San Diego County north through the Sierra Nevada and (less commonly) in the Coast Ranges, through the mountains and valleys of Oregon and Washington to British Columbia east to the Rocky Mountains. Type locality: "northwest of North America, in all the country bordering on the river Columbia, as far to the eastward as the valleys of the Rocky Mountains, but not beyond that great dividing ridge." May–Aug.

7. *Collomia heterophylla* Hook. Varied-leaved *Collomia*. Fig. 3903.

- Collomia heterophylla* Hook. Bot. Mag. 56: pl. 2895. 1829.
Gilia heterophylla Dougl. ex Hook. loc. cit., as a synonym.
Courtoisia bipinnatifida Reichb. Cat. Hort. Dresd. 1829, ex Reichb. Icon. Bot. Exot. 3: 4. pl. 208. 1830.
Courtoisia daucifolia Reichb. Cat. Hort. Dresd. 1829, ex Reichb. loc. cit., as a synonym.
Gilia pinnatifida Sessé & Moc. ex G. Don, Gen. Hist. Pl. 4: 245. 1838.
Gilia Sessei G. Don, loc. cit.
Navarretia heterophylla Benth. ex A. DC. Prod. 9: 309. 1845.

Erect, decumbent or spreading annuals, 5–15 cm. high, stems much-branched, rarely simple, herbage glandular-pilose to villous, viscid, clammy. Leaves from variously toothed to pinately dissected, when simple or nearly simple, the blade orbicular; opposite or alternate below, alternate above, thin, often very diverse on an individual plant; flowers sessile, congested in clusters at ends of branches and in axils of upper leaves; calyx campanulate, lobes lanceolate-attenuate; corolla narrow-funnelform to subsalverform, 8–12 mm. long, pink to white, lobes rotately spreading; stamens inserted unequally on the throat, the lowermost on short filaments near base of throat, the upper on long filaments, exserted, filaments very unequal; stigma reaching the lowermost stamens; locules of capsules 2–3-seeded.

From Vancouver Island, south on the west side of the Cascades through the Sierra Nevada to Kern County and in the Coast Ranges to Monterey County, California. Type locality: "about Fort Vancouver, on the Columbia." Collected by Douglas. April–July.

8. *Collomia diversifolia* Greene. Serpentine *Collomia*. Fig. 3904.

- Collomia diversifolia* Greene, Pittonia 1: 128. 1887.
Navarretia diversifolia Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Erect annuals, 3–10 cm. high, divaricately branched. Leaves petioled or subsessile, blade elliptic, entire or coarsely 3-toothed or incised at summit, those of inflorescence usually entire, glandular-villous, thick; flowers sessile to subsessile or short-pedicelled, congested in clusters at ends of branches; calyx about 10 mm. long, segments lanceolate to lance-acuminate, glandular-villous to viscid, green to base, the replicate sinuses chartaceous to the base of the tube, but not membranous, calyx-tube thus with alternate green and white longitudinal bands; corolla tubular-funnelform, tube relatively stout, purple, throat and base of lobes yellow, lobes pink to purple; stamens unequally inserted, the upper on the throat, the lower on the tube, filaments subequal, anthers included; stigma included, reaching the lowest stamens; capsule ellipsoid-oblong, locules 2-seeded.

Serpentine outcrops of the Inner North Coast Ranges from Napa County to Colusa and Mendocino Counties, California. Type locality: "along Epperson's Road, in the mountains of Colusa County." May–June.

9. *Collomia debilis* (S. Wats.) Greene. Alpine *Collomia*. Fig. 3905.

- Gilia debilis* S. Wats. Amer. Nat. 7: 302. 1873.
Collomia debilis Greene, Pittonia 1: 127. 1887.
Gilia Howardii M. E. Jones, Zoe 2: 250. 1891.
Collomia debilis subsp. *typica* Payson, Univ. Wyo. Pub. Sci. 1: 81. 1924.

Tufted rhizomatous perennial 1–2 dm. high; stems erect or decumbent. Leaves entire to conspicuously 3–7-toothed or lobed, 1–4 cm. long, thick, glandular-villous; flowers sessile or short-pedicelled, congested at the ends of branches; calyx obconic, herbaceous to chartaceous, lobes lanceolate, equaling the tube; corolla tubular-funnelform, 15–22 mm. long, 2–2.5 times calyx, throat narrowing imperceptibly to base of tube, pink or blue to white, often becoming



3902. *Collomia grandiflora*
3903. *Collomia heterophylla*

3904. *Collomia diversifolia*
3905. *Collomia debilis*

3906. *Collomia Larsenii*

purple or violet on drying; stamens equally inserted at base of throat, exserted, filaments equal; style long-exserted; capsule obovoid, locules 1-seeded.

High mountains of Washington and Oregon to Utah and Montana. Type locality: "Utah (Wheeler)." June-Aug.

10. *Collomia Larsenii* (A. Gray) Payson. Talus *Collomia*. Fig. 3906.

Gilia Larsenii A. Gray, Proc. Amer. Acad. 11: 84. 1875.

Collomia debilis var. *Larsenii* Brand, Pflanzenreich 4250: 52. 1907.

Gilia debilis var. *Larsenii* J. F. Macbride, Contr. Gray Herb. No. 56: 57. 1918.

Collomia Larsenii Payson, Univ. Wyo. Pub. Sci. 1: 85. 1924.

Tufted perennial from a deep-seated root system, erect, decumbent, or prostrate; stems 2-7 cm. high, pilose-hirsute. Leaves twice or thrice pedately dissected, thick, hirsute-villous; flowers congested into cymes at ends of branches; calyx hirsute-villous, 6-8 mm. long, lobes lanceolate, longer than tube; corolla narrowly funnelform, 2 times calyx, pink to blue, sometimes becoming violet on drying; stamens equally inserted at base of throat, longer than throat, subequal to unequal, exserted; capsule obovoid, equaling calyx-tube, locules 1-seeded.

Mostly on high volcanic peaks of the Olympic and Cascade Mountains from Mount Angelus, Clallam County, Washington, to Mount Lassen, California. Type locality: Mount Lassen, California. July-Sept.

11. *Collomia mazama* Coville. Mazama *Collomia*. Fig. 3907.

Collomia mazama Coville, Proc. Biol. Soc. Wash. 11: 35. 1897.

Gilia mazama Nels. & Macbr. Bot. Gaz. 61: 34. 1916.

Few to many-stemmed perennials from a slender taproot; stems 15-30 cm. high, simple or with few branches toward tip, glandular-hairy and strong scented. Leaves petioled, blades

oblong-lanceolate to elliptic, coarsely serrate-toothed or incised above, entire below; flowers congested in subcapitate cymes; calyx 7–9 mm. long, lobes lanceolate-attenuate, subequal to the tube; corolla narrowly funnelform, 10–15 mm. long, limb 8–10 mm. wide, deep blue or violet, lobes 5 mm. long; stamens equally inserted on base of throat, anthers white, exserted, filaments unequal; stigma exserted; capsule equal to the calyx-tube, locules 1-seeded.

Southern Cascades in Klamath and Jackson Counties, Oregon, on Mount Mazama (rim of Crater Lake) and Mount McLoughlin. Type locality: Mount Mazama. July–Aug.

12. *Collomia Rawsoniana* Greene. Flaming Trumpet. Fig. 3908.

Collomia Rawsoniana Greene, Pittonia 1: 221. 1888.

Gilia Rawsoniana J. F. Macbride, Contr. Gray Herb. No. 56:57. 1918.

Erect or ascending, herbaceous perennial, in small or large clumps from an intricately interlaced rhizome system; stems 1–6 dm. high, simple or with a few branches toward tip, herbage glandular-villous, viscid-clammy, with a strong mephitic odor. Leaves all cauline, on short petioles, blades thin, 4–10 cm. long, 1.5 cm. broad, elliptic, coarsely and unequally serrate or incised, entire toward base; flowers on short pedicels, congested at the ends of branches and subtended by a few reduced leaves; calyx campanulate, 8–12 mm. long, lobes lanceolate-attenuate, wholly herbaceous, not at all chartaceous in anthesis, becoming so in age, viscid-glandular and beset with few long weak hairs; corolla tubular-funnelform, 2.5–4 cm. long, limb 1.5–2 cm. broad, glabrous, limb orange-red with yellow throat and tube, often with delicate pencilling on the base of petals and throat, throat tapering imperceptibly to tube; stamens equally inserted low in tube, unequally exserted; stigma very small, exserted; capsule ellipsoid, locules 1-seeded.

Transition Zone from Nelder Creek, a tributary of Fresno River to Whiskey Creek, a tributary of the north fork of the San Joaquin River, Madera County, California. Type locality: "higher valleys of the Sierra Nevada, in Fresno County, California, by Mrs. L. A. Peckenpah." Probably near Peckenpah Mill on Peckenpah Creek in Madera County, then a part of Fresno County. July.

3. *GYMNÓSTERIS* Greene, Pittonia 3: 303. 1898.

Diminutive leafless annuals with simple stems, bearing at the base a turbinate or campanulate sheath composed of the united persistent cotyledons. Flowers few in terminal bracteate heads. Bracts 4 or 5, herbaceous and free above, scarious and united at base forming an involucre. Calyx vesicular and urceolate, scarious below, only the tips herbaceous. Corolla salverform or slender-funnelform, white or yellow, marcescent-persistent. Stamens sessile, borne in the corolla-throat. Capsule dehiscent, many-seeded. Seeds obliquely cubical, the angles membranously margined or winged; testa mucilaginous when wet. [Name Greek, meaning naked and foundation in reference to the leafless stem.]

A western North American genus of 2 species. Type species, *Collomia nudicaulis* Hook. & Arn.

Corolla-tube 10 mm. long; limb 8–15 mm. broad.

Corolla-tube 5 mm. long; limb 1.5–3 mm. broad.

1. *G. nudicaulis*.

2. *G. parvula*.

1. *Gymnosteris nudicaulis* (Hook. & Arn.) Greene. Large-flowered *Gymnosteris*. Fig. 3909.

Collomia nudicaulis Hook. & Arn. Bot. Beechey 368. 1838.

Gilia nudicaulis A. Gray, Proc. Amer. Acad. 8: 266. 1870.

Navarretia nudicaulis Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Gymnosteris nudicaulis Greene, Pittonia 3: 304. 1898.

Linanthus nudicaule Howell, Fl. N.W. Amer. 456. 1901.

Stems slender, solitary or sometimes with 1 or more very slender auxiliary ones arising from the fleshy connate cotyledons, 3–15 cm. high. Floral bracts 1–1.5 cm. long, lanceolate, the outer dilated at base; calyx about 5 mm. long, the lobes subulate; corolla-tube very slender, 9–12 mm. long, throat dilated, usually bright yellow, the limb 8–12 mm. broad, varying from bright yellow to lavender or white, the lobes obovate, usually blunt or subtruncate and mucronate at apex; style and stamens slightly to well-exserted.

Sandy plains, Upper Sonoran and Arid Transition Zones; Malheur County, southeastern Oregon, to southern Idaho and Nevada where it ranges as far west as Steamboat Springs, Washoe County. Type locality: "Hab. Green River, Snake Country. Mr. Tolmie." April–June.

Gymnosteris nudicaulis var. *pulchella* (Greene) Brand, Pflanzenreich 4²⁰: 151. 1907. (*Gymnosteris pulchella* Greene, Pittonia 3: 304. 1898.) Corolla generally larger, the limb up to 15 mm. broad; but the size is variable, and it is doubtful if this is more than a variant as expressed by Wherry, Amer. Midl. Nat. 31: 231. 1944. Type locality: Steamboat Springs, Nevada.

2. *Gymnosteris parvula* (Rydb.) Heller. Small-flowered *Gymnosteris*. Fig. 3910.

Gilia parvula Rydb. Mem. N.Y. Bot. Gard. 1: 320. 1900.

Gymnosteris parvula Heller, Muhlenbergia 1: 3. 1900.

Gymnosteris Leibergii Brand, Rep. Spec. Nov. 17: 318. 1921.

Gymnosteris nudicaule var. *parvula* Jepson, Man. Fl. Pl. Calif. 809. 1925.

Gymnosteris minuscula Jepson, loc. cit.

Stems very slender, simple or sometimes with 1 to several more slender auxiliary ones arising from the cotyledons, 1–5 cm. high. Floral bracts 5–10 mm. long, usually abruptly narrowed from a broad ovate base, purple-tinged, scarious-connate below; calyx 3–4 mm. long,

the tube mainly scarious; corolla-tube about equaling the calyx in anthesis, throat dilated, limb 1.5–3 mm. broad, oblong-oblancoelate, acutish, pale yellow, often purplish in age.

Dry sandy soil, Upper Sonoran Zone to Canadian Zone; western Harney County, southern Oregon, south-east of the Cascades and Sierra Nevada to the White Mountains, Mono County, California, east to Idaho, Nevada, Utah, Wyoming, and Colorado. Type locality: Swan Lake, Yellowstone Park, Wyoming. April–July.

4. *PHLÓX* L. Sp. Pl. 151. 1753.

Perennial or rarely annual, erect, diffuse or caespitose herbs with opposite leaves or sometimes the uppermost alternate. Flowers often showy, white, blue, purple or red, in terminal cymes or cymose panicles, or sometimes solitary. Calyx tubular to tubular-campanulate, 5-cleft and 5-ribbed, the lobes acute or acuminate, usually with scarious margins and sinuses. Corolla salverform with narrow tube and 5-lobed rim; lobes obovate to orbicular or obcordate, spreading. Stamens included, irregularly inserted on the corolla-tube. Ovary ovoid to oblong, 3-celled; style usually slender; ovules 1–4 in each cell. Capsule ovoid, 3-valved, distending and rupturing the calyx-tube in age. Seeds usually solitary in the cells of the capsule, ovoid or narrowly winged, not emitting spiral threads when wet. [Name Greek, meaning flame.]

A genus of about 45 species, native of North America and northern Asia. Type species, *Phlox glaberrima* L. Perennials.

Plants not caespitose, the stems usually erect, with distinct internodes; leaves not rigid or acerose.

Style longer than the calyx.

Leaves 1–4 cm. broad; stems mostly prostrate, often developing adventitious roots.

1. *P. adsurgens*.

Leaves at most not over 6 mm. broad; stems erect or ascending, not developing adventitious roots.

Corolla-tube 1–2.5 cm. long.

Herbage glabrous throughout or glandular-pubescent only in the inflorescence; corolla-tube 1–1.5 cm. long.

2. *P. longifolia*.

Herbage glandular-pubescent throughout; corolla-tube 1–2.5 cm. long.

3. *P. Stansburyi*.

Corolla-tube 3.5–4 cm. long.

4. *P. dolichantha*.

Style 2–4 mm. long, shorter than the calyx.

5. *P. speciosa*.

Plants low and tufted or caespitose; leaves crowded, very narrow and often rigid and pungent; style shorter than the calyx.

Intercostal membrane distinctly carinate; leaves acerose or narrowly subulate.

Stems glabrous below, glandular-pubescent above; leaves 1.5–3 cm. long.

6. *P. aculeata*.

Stems glabrous below, pubescent above, not glandular; leaves 1–1.5 cm. long, pubescent above, glabrous beneath.

7. *P. austromontana*.

Intercostal membrane flat or inconspicuously carinate.

Pubescence glandular.

Surface of the leaves glabrous.

Pubescence glandular throughout; leaf-margins inconspicuously ciliate; leaves mainly subulate; internodes about as long as leaves.

8. *P. Douglasii*.

Pubescence with both glandular and eglandular hairs; leaf-margins conspicuously ciliate below; internodes evident but shorter than the leaves, these mostly 4–6 mm. long.

9. *P. caespitosa*.

Surface of the leaves glandular-hispid; leaves narrowly oblong, less than 5 mm. long.

10. *P. Covillei*.

Pubescence not glandular.

Plants caespitose or loosely pulvinate; pubescence sparser or wanting in the internodes; leaves subulate.

Plants bright green, usually diffusely branched; leaves and internodes very thinly villous.

11. *P. diffusa*.

Plants pale grayish green; wooly tomentose on the leaf-margins and rather sparsely so on the internodes.

12. *P. canescens*.

Plants pulvinate, densely tomentose throughout.

Leaves 5–10 mm. long, plane, subulate, spaced, not closely imbricated, the cylindric stem exposed.

13. *P. lanata*.

Leaves 3–5 mm. long, concave, oblong-elliptic, imbricated, completely concealing the stem, this forming moss-like 4-angled branches.

14. *P. bryoides*.

15. *P. gracilis*.

Annuals.

1. *Phlox adsurgens* Torr. Woodland Phlox. Fig. 3911.

Phlox adsurgens Torr. ex A. Gray, Proc. Amer. Acad. 8: 256. 1870.

Perennial with slender roots, stems several, slender, creeping or decumbent, simple or sparingly branched, 2–5 dm. long, glabrous below, puberulent to glandular-villous and with short hairs. Leaves lanceolate-ovate to round-ovate or obovate, thin, sessile, or short-petioled, 7–30 mm. long, 5–15 mm. wide; inflorescence open, mostly few-flowered; calyx 10–13 mm. long, the lobes subulate with a prominent midrib, equaling or often a little longer than the tube; membranous sinus not carinate; corolla bright pink, tube 12–18 mm. long, lobes obovate, about half as long as the tube, rounded at apex; style nearly equaling the corolla-tube.

Open forests, mainly Humid Transition Zone; Linn County, western Oregon, southward to Siskiyou and Mendocino Counties, northwestern California. Type locality: "Cañon Pass, Oregon." June–Aug.

2. *Phlox longifolia* Nutt. Long-leaved Phlox. Fig. 3912.

Phlox longifolia Nutt. Journ. Acad. Phila. 7: 41. 1834.

Phlox speciosa var. *linearifolia* Hook. Kew Journ. Bot. 3: 289. 1851.

Phlox speciosa var. *latifolia* Hook. loc. cit.

Armeria longifolia Kuntze, Rev. Gen. Pl. 2: 432. 1891.

Phlox colubrina Wherry & Constance, Amer. Midl. Nat. 19: 433. figs. 1, 2. 1938.

Stems 1–4 dm. long, usually erect, sometimes spreading or decumbent, woody below, much-branched to nearly simple, rather sparsely and finely pubescent above. Leaves narrowly linear-lanceolate to narrowly linear, from 5–10 cm. long, 1.5–3 mm. wide, firm, short-acuminate but not pungent; cymes open, few- to many-flowered; pedicels slender, 1–3 cm. long; calyx 10–12 mm. long, the lobes about half as long as the tube, the sinus-membrane broad and conspicuously inflated; corolla white to lilac, tube 12–18 mm. long, limb 15–20 mm. broad, lobes spatulate-obovate to narrowly obovate, rounded or shallowly notched; styles about as long or a little longer than the corolla-tube.

Dry slopes and edges of mountain meadows, Arid Transition Zone; eastern base of the Cascades, Washington, to northern Oregon, east to Montana and Colorado. Type locality: "valleys of the Rocky Mountains generally." May–July.

Phlox longifolia subsp. *compácta* (Brand) Wherry, Proc. Acad. Phila. 90: 135. 1938. (*Phlox Stansburyi* subsp. *compacta* Brand, Pflanzenreich 4⁵⁰: 67. 1907; *P. puberula* A. Nels. in Coult. & Nels. Man. Bot. Rocky Mts. 397. 1909.) Dwarf and compactly branched, mostly 6–10 cm. rarely over 15 cm. high, densely glandular-villous, except at base, with short hairs; leaves 2–4 cm. long and 2–3 mm. wide; corolla-lobes usually a little shorter than in the typical species. Sagebrush slopes, Klickitat County, southern Washington, and Wasco County, Oregon, southeast of the Cascades to northeastern California and Nevada, east to Idaho. Type locality: not given.

Phlox longifolia subsp. *humilis* (Dougl.) Wherry, Proc. Acad. Phila. 90: 135. 1938. (*Phlox humilis* Dougl. ex Hook. Fl. Bor. Amer. 2: 72. 1840.) Low and often compact as in the preceding subspecies, but the stems and leaves glabrous or more or less thinly short-villous and little or not at all glandular; pedicels and calyx short-villous. Eastern Washington and Oregon to Idaho. Type locality: "Rocky Mountains near perpetual snow, and on the Blue Mountains."

Phlox longifolia subsp. *lóngipes* (M. E. Jones) Wherry, Proc. Acad. Phila. 90: 135. 1938. (*Phlox linearifolia* var. *longipes* M. E. Jones, Contr. West. Bot. No. 12: 53. 1908.) Similar to the typical species but the inflorescence glandular-pubescent throughout. Wallowa Mountains, northeastern Oregon, to the Rocky Mountains. Type locality: "Weiser, Idaho."

Phlox longifolia subsp. *calva* Wherry, Proc. Acad. Phila. 90: 136. 1938. Plants 1–5 dm. high, glabrous throughout except in the inner side of the calyx-lobes; longer leaves, 4.5–9 cm. long. Washington and northern Oregon east of the Cascades, east to Montana and Colorado. Type locality: "Darlington, Custer County, Idaho."

Phlox longifolia subsp. *brevifolia* (A. Gray) H. L. Mason. (*Phlox longifolia* f. *brevifolia* A. Gray, Proc. Amer. Acad. 8: 255. 1870; *P. Stansburyi* var. *brevifolia* E. Nels. Rev. W.N. Amer. Phloxes 27. 1899; *P. Grayi* Woot. & Standley, Contr. U.S. Nat. Herb. 16: 161. 1913.) Plants compact, 5–10 cm. high, rather densely glandular-villous, with short spreading hairs; leaves linear-lanceolate, 0.5–3 cm. long, the lower usually narrowly lanceolate to linear-lanceolate, and usually shorter than the lanceolate or narrowly lanceolate, sparsely attenuate upper, all firm with prominent midrib and calloused margins, thinly glandular-puberulent. Sagebrush slopes and plains, Arid Transition and Upper Sonoran Zones; east of the Sierra Nevada, California, from Lassen County to the Kingston Mountains, San Bernardino County, east to Utah and New Mexico. Type locality: "chiefly in the southern districts [Utah and Nevada], and extending into New Mexico and Arizona."

3. *Phlox Stansburyi* (Torr.) Heller. Stansbury's Phlox. Fig. 3913.

Phlox speciosa var. ? *Stansburyi* Torr. Bot. Mex. Bound. 145. 1859.

Phlox Stansburyi Heller, Bull. Torrey Club 24: 478. 1897.

Phlox longituba Heller, Muhlenbergia 2: 228. 1905.

Stems few to several from the simple or branched root crown, 1–4 cm. high, more or less densely woolly pubescent throughout, especially above the middle, and glandular above. Leaves grayish green, linear-lanceolate, 1.5–3 cm. long, attenuate at apex, often scabrous, the upper glandular-tomentose; flowers several in simple or branched cymose clusters; pedicels 5–25 mm. long; calyx 7–10 mm. long, glandular-villous, the lobes subulate, distinctly shorter than the tube, scarious intervals of the tube often carinate before being distended by the growing capsule; corolla 2–2.5 cm. long, usually pink and white, limb 10–15 mm. broad, lobes oblong-spatulate; style and stigma-lobes very slender over half the length of the corolla-tube.

Dry gravelly slopes, Upper Sonoran and Arid Transition Zones; eastern slopes of the Sierra Nevada, Inyo County, east to New Mexico. Type locality: "Gravelly hills near the Organ Mountains, New Mexico." April–June.

Phlox hirsuta E. Nels. Rev. W.N. Amer. Phloxes 28. 1899. (*Phlox Stansburyi* var. *hirsuta* Jepson, Fl. Calif. 3: 141. 1943.) Stems usually several from the stout woody base, 10–15 cm. high, simple or with a few terminal cymose branches, hirsute throughout. Leaves ovate-lanceolate to linear-lanceolate, mostly 2–3 cm. long, attenuate at apex, firm, rather thinly villous and minutely granular on the thickened margins; flowers usually 3 or 4 at the ends of the branches, short-pedicelled to subsessile; calyx 12–14 mm. long, the tube conspicuously villous-hirsute, membranous sinuses narrow not carinate; corolla-tube equaling or slightly exceeding the calyx, limb about 15 mm. broad, lobes cuneate-obovate; style 4 mm. long; ovules solitary in each cell. Dry hillsides; known only from dry hillsides near Yreka, and Mill Creek near Etna Mills, Siskiyou County, California.

4. *Phlox dolichántha* A. Gray. Bear Valley Phlox. Fig. 3914.

Phlox dolichantha A. Gray, Proc. Amer. Acad. 22: 310. 1887.

Phlox bernardina Munz & Jtn. Bull. Torrey Club 49: 356. 1922.

Phlox dolichantha var. *bernardina* Jepson, Fl. Calif. 3: 141. 1943.

Stems from a rather slender woody root, erect or ascending, 15–25 cm. high, glabrous or sparingly villous with short kinky hairs below, glandular-puberulent above. Leaves narrowly lanceolate-attenuate, 2–5 cm. long or in secondary branchlets shorter, sometimes slightly falcate, midvein slender and margins only slightly thickened, lower nearly glabrous, upper glandular-pubescent; flowers in a several-flowered cymose cluster at the end of the branches; pedicels



3907



3908



3909



3910



3911



3912



3913



3914



3915

3907. *Collomia mazama*3908. *Collomia Rawsoniana*3909. *Gymnosteris nudicaulis*3910. *Gymnosteris parvula*3911. *Phlox adsurgens*3912. *Phlox longifolia*3913. *Phlox Stansburyi*3914. *Phlox dolichantha*3915. *Phlox speciosa*

5–20 mm. long, glandular, calyx 10–12 mm. long, glandular-puberulent, teeth subulate about as long as the tube; corolla pink, salverform, 3.5–4.5 cm. long, limb 1.5–2 cm. broad, lobes oblong-obovate; style capillary, 2.5–3 cm. long.

Dry slopes in open pine forests, Arid Transition Zone; San Bernardino Mountains, California. Type locality: Bear Valley, San Bernardino County, as first delimited by Brand, *Pflanzenreich* 4²⁰⁰: 67. 1907. May–July.

5. *Phlox speciosa* Pursh. Showy Phlox. Fig. 3915.

Phlox speciosa Pursh, Fl. Amer. Sept. 1: 149. 1814.

Stems 2–4 dm. high, the foliose branches few to many from the branched woody base, erect, more or less crisped-puberulent and glandular above, glabrous or nearly so below. Leaves thinnish, linear-lanceolate, acuminate or long-acuminate, 2.5–5 cm. long, 2–5 mm. wide, the lower nearly or quite glabrous, the upper glandular-puberulent with crisped hairs; cymes few-flowered, lower flowers leafy-bracted, pedicels 1–4 cm. long; calyx 7–10 mm. long, glandular-puberulent, the lobes linear, shorter than the tube; corolla bright pink, tube 1–1.5 cm. long, limb 1.5–2 cm. broad, lobes obcordate or deeply 2-lobed; style 2–4 mm. long.

Grassy slopes, Arid Transition Zone; east of the Cascades, from Chelan County, Washington, to Wasco County, Oregon, east to Montana. Type locality: "On the plains of the Columbia." Collected by Lewis, "probably on the Clearwater below Kamiah, Idaho." (Piper, Contr. U.S. Nat. Herb. 11: 458. 1906.) May–June.

Phlox speciosa subsp. *lanceolata* (E. Nels.) Wherry, Proc. Acad. Phila. 90: 133. 1938. (*Phlox lanceolata* E. Nels. Rev. W.N. Amer. Phloxes 29. 1899.) Stems usually 20–30 cm. high, rather stout, with short internodes, glandular-puberulent; leaves on flowering stems firm, lanceolate, only the upper acuminate, 2–6 cm. long, 5–10 mm. broad; corolla commonly white. On sagebrush or yellow pine slopes, Upper Sonoran and Arid Transition Zones; central Washington from Chelan County to Yakima County. Type locality: Ellensburg, Kittitas County, Washington.

Phlox speciosa subsp. *occidentalis* (Durand) Wherry, Proc. Acad. Phila. 90: 133. 1938. (*Phlox divaricata* var. *occidentalis* Durand, op. cit. 3: 97. 1855.) Leaves a little thicker, somewhat coriaceous, and rather short-acuminate, and the plants generally not as tall, averaging about 25 cm. This variant ranges from the Cascades of northern Oregon to the Siskiyou Mountains and the Sierra Nevada, California. Type locality: vicinity of Nevada City, Nevada County, California.

Phlox speciosa subsp. *nitida* (Suksd.) Wherry, Proc. Acad. Phila. 90: 134. 1938. (*Phlox speciosa* var. *nitida* Suksd. Deutsch. Bot. Monatss. 18: 132. 1900.) Plant glabrous or nearly so throughout, strongly woody below, erect or spreading; leaves narrowly linear-lanceolate, 5–8 cm. long; pedicels almost filiform, 2.5–5 cm. long; corolla-limb 2.5–3 cm. broad. Cascades of southern Washington to the Siskiyou Mountains, California. Type locality: Klickitat County, Washington.

Phlox speciosa subsp. *lignosa* Brand, *Pflanzenreich* 4²⁰⁰: 73, 74. 1907. (*Phlox Whiteii* E. Nels. Erythraea 7: 167. 1899.) Plants lower and more compact, the stems usually about 20 cm. high with strong internodes; leaves many, linear to lanceolate, mostly 1–1.5 cm. or rarely up to 3 cm. long. East of the Cascades from Chelan County, Washington, to Wasco County, Oregon. Type locality: Wenatchee, Washington.

6. *Phlox aculeata* A. Nels. Needle-leaved Phlox. Fig. 3916.

Phlox aculeata A. Nels. Bot. Gaz. 52: 270. 1911.

Stems compactly branched and tufted on the short-branched woody root crown, 5–15 cm. high, glabrous and shining below, glandular-pubescent above. Leaves very narrowly subulate, 1.5–3 cm. long, barely 1 to 2 mm. wide, glabrous or sparsely villous on the margins, especially near the base; pedicels mostly about 5 mm. long, glandular-pubescent; calyx 1 cm. long, glandular-pubescent, lobes 4–5 mm. long, attenuate at apex, tube about equaling the lobes or shorter, the scarious membrane between the ribs prominently carinate; corolla lilac or blue, tube about 12 mm. long, limb 12–15 mm. broad, lobes blunt or emarginate at apex.

Dry plains and bench-lands, Upper Sonoran and Arid Transition Zones; eastern base of the Cascades, Oregon, east to Idaho. Type locality: dry bench-lands near New Plymouth, Idaho. April–June.

7. *Phlox austromontana* Coville. Western Mountain Phlox. Fig. 3917.

Phlox austromontana Coville, Contr. U.S. Nat. Herb. 4: 151. 1893.

Phlox Douglasii var. *austromontana* Jepson & Mason in Jepson, Man. Fl. Pl. Calif. 786. 1925.

Phlox austromontana subsp. *vera* Wherry, Journ. Wash. Acad. 29: 518. 1939.

Plants caespitose with a woody caudex, 5–10 cm. high, the leafy branchlets canescent with short spreading pubescence, not glandular. Leaves mostly 10–15 mm. long, acerose, ascending or spreading in age, pubescent above, often glabrate below; flowers solitary at the ends of the branches; pedicels 4–8 mm. long; calyx 6–10 mm. long, the teeth acerose, a little longer than the tube, strongly ribbed, villous on the margins, tube glabrous or nearly so, the thin membrane between the ribs replicate; corolla white or purplish, tube 11–14 mm. long, lobes obovate, 5–7 mm. long; styles shorter than the calyx.

Dry gravelly flats and rocky ridges, Arid Transition Zone; San Gabriel Mountains to the Santa Rosa and Cuyamaca Mountains, southern California; also southern Nevada, northern Arizona and southern Utah, and San Pedro Martir Mountains, Lower California. Type locality: "in the nut-pine belt of the Beaverdam Mountains, Utah." May–July.

8. *Phlox Douglasii* Hook. Douglas' Phlox. Fig. 3918.

Phlox Douglasii Hook. Fl. Bor. Amer. 2: 73. 1840.

Plants rather loosely caespitose, 8–20 cm. high, the branches woody at base, spreading, herb-
age glandular-pubescent throughout. Leaves 8–12 mm. long, linear-subulate to narrowly subulate, firm with prominent midrib, pungent at apex; flowers 1–3, terminating the branches, sessile or short-pedicelled; calyx 7–10 mm. long, the lobes about equaling the tube, spreading, glandular-villous, sinus narrow, ribs prominent; corolla pale pink to lilac or sometimes white, tube

distinctly longer than the calyx, lobes 6–8 mm. long, obovate, rounded at apex; style 4–7 mm. long.

Dry slopes and ridges, Arid Transition and Canadian Zones; east of the Cascades from Grant and Spokane Counties, Washington, to the Wallowa Mountains, Oregon. Type locality: "N.W. America; common on the limestone range of the Blue Mountains [Oregon], and on the Rocky Mountains, near the confines of snow." April–June.

Phlox Douglasii subsp. *rigida* (Benth.) Wherry, Proc. Acad. Phila. 90: 137. 1938. (*Phlox rigida* Benth. in A.D.C. Prod. 9: 306. 1845; *P. caespitosa* var. *rigida* A. Gray, Proc. Amer. Acad. 8: 254. 1870.) Plants lower and compactly caespitose, 3–8 cm. high; leaves more rigid and pungent, mostly 4–6 mm. long, glaucous-green. Dry ridges and sagebrush plains, Arid Transition Zone; east of the Cascades, from Crook County, Oregon, to Modoc County, California, east to Idaho and Nevada. Type locality: Blue Mountains, Oregon. Collected by Douglas.

Phlox Douglasii subsp. *Hendersönnii* (E. Nels.) Wherry, Proc. Acad. Phila. 90: 137. 1938. (*Phlox condensata* var. *Hendersönnii* E. Nels. Rev. W.N. Amer. Phloxes 14. 1899.) More dwarfed, mostly 2.5–4 cm. high; leaves appressed, 2–5 mm. long; calyx 5–8 mm. long. Alpine summits of the Cascades, southern Washington and Oregon. Type locality: Mount Adams, Washington.

9. *Phlox caespitosa* Nutt. Clustered Phlox. Fig. 3919.

Phlox caespitosa Nutt. Journ. Acad. Phila. 7: 41. 1834.

Phlox Douglasii var. *caespitosa* H. L. Mason ex Jepson, Man. Fl. Pl. Calif. 786. 1925.

Low, densely caespitose with slender branches, 5–12 cm. high. Leaves rather broadly linear, 6–10 mm. long, 3-ribbed, the grooves between the midrib and inrolled margin relatively broad, somewhat abruptly pungent, glaucous-green, minutely puberulent with glandless and gland-tipped hairs, strongly villous, especially on the margins; flowers usually solitary at the ends of the branchlets, subsessile; calyx 8 mm. long, the teeth subulate, a little narrower than the leaves, prominently ribbed, the membranous intervals below narrow; corolla lilac to white, tube 12–15 mm. long, slender, lobes broadly obovate, 5–6 mm. long; style about 3 mm. long.

Rocky gravelly ridges and slopes, Boreal Zones; near the summit of the Wallowa Mountains, northeastern Oregon, east to Montana, Colorado, and New Mexico. Type locality: "Flat-Head River, on the ridges of dry hills," Montana. May–Aug.

10. *Phlox Covillei* E. Nels. Coville's Phlox. Fig. 3920.

Phlox Covillei E. Nels. Rev. W.N. Amer. Phloxes 15. 1899.

Phlox caespitosa var. *Covillei* Brand, Pflanzenreich 4²⁵⁰: 84. 1907.

Phlox Douglasii var. *Covillei* Jepson, Fl. Calif. 3: 140. 1943.

Caudex woody, depressed-caespitose and cushion-like. Leaves appressed or ascending on the slender seasonal branches, narrowly linear, abruptly narrowed at the apiculate apex, 3–5 mm. long, ciliate on the thickened rib-like margins, the surface sparsely and minutely glandular-pubescent, lower surface rather broadly grooved between the thickened midrib and the margins; flowers usually solitary and sessile at the ends of the branches; calyx 5–6 mm. long, glandular-puberulent, the lobes very similar to the leaves, about as long or distinctly shorter than the tube, their prominent midribs extending down the tube; corolla white to pale pink, tube 8–10 mm. long, hairy at the base within, lobes broadly obovate to suborbicular, 4 mm. long; style about 2 mm. long.

Rocky ridges and slopes, Arid Transition and Canadian Zones; eastern slopes of the central and southern Sierra Nevada and White Mountains, California. Type locality: "Black Cañon, White Mountains, Mono Co., California." July–Sept.

11. *Phlox diffusa* Benth. Spreading Phlox. Fig. 3921.

Phlox diffusa Benth. Pl. Hartw. 325. 1849.

Phlox Douglasii var. *diffusa* A. Gray, Proc. Amer. Acad. 8: 254. 1870.

Phlox Peckii Wherry, Proc. Acad. Phila. 90: 140. 1938.

Plant freely branching from a stout woody base, the branches woody, spreading or prostrate, 1–3 dm. long, rather thinly tomentose to glabrate. Leaves narrowly linear to linear-subulate, only moderately rigid and pungent, 10–15 mm. long; flowers usually solitary, terminating short leafy branches; pedicels 1–4 mm. long; calyx 8–10 mm. long, rather thinly villous, lobes about equaling or shorter than the tube; corolla pink, lilac or sometimes white; tube 10–13 mm. long; lobes broadly obovate to obovate-spatulate, 6–7 mm. long; style 3–5 mm. long.

Dry slopes and open pine forests, Arid Transition and Canadian Zones; southern Cascades and Siskiyou Mountains, Oregon, south in the Sierra Nevada to southern California. Type locality: "prope Bear Valley in montibus Sacramento," California. May–Aug.

Phlox diffusa subsp. *longistylis* Wherry, Proc. Acad. Phila. 90: 139. fig. 2. 1938. Differs principally in the longer (6–10 mm.) styles; whole plant and flowers usually smaller. Mainly Canadian Zone; Olympic Mountains, Washington, and the Cascades from southern British Columbia to Lane County, Oregon. Type locality: "south slope of Mt. Adams, Yakima County, Washington."

Phlox diffusa subsp. *subcarinata* Wherry, Journ. Wash. Acad. 29: 517. fig. 1. 1939. Leaves stiffer, pale glaucous-green, at least the upper villous-tomentose; membranous sinuses of the calyx usually subcarinate, conspicuously villous-tomentose. Eastern base of the Cascades, Washington, and Oregon, east to the northern slopes of the Sierra Nevada and the mountains of southern California. Type locality: Mount Rose, Washoe County, Nevada.

Phlox diffusa subsp. *scleranthifolia* (Rydb.) Wherry, Notulae Naturae No. 87: 13. 1941. (*Phlox scleranthifolia* Rydb. Mem. N.Y. Bot. Gard. 1: 313. 1900.) Plants prostrate and loosely branched to compact, herbage glabrous to puberulent or rarely sparsely villous-tomentose; leaves very narrowly subulate, stiff and pungent, frequently turned upward. Southeastern Oregon to Montana and South Dakota. Type locality: Hot Springs, Black Hills, South Dakota.

12. *Phlox canescens* Torr. & Gray. Gray or Woolly Phlox. Fig. 3922.

Phlox canescens Torr. & Gray, Pacific R. Rep. 2: 122. pl. 6. 1857.

Phlox Douglasii var. *canescens* H. L. Mason ex Jepson, Man. Fl. Pl. Calif. 786. 1923.

Phlox Hoodii subsp. *canescens* Wherry, Proc. Acad. Phila. 90: 139. 1938.

Phlox Hoodii var. *canescens* M. E. Peck, Man. Pl. Oregon 572. 1941.

Plant pulvinate, 5–20 cm. broad, the leafy branches woolly-villous. Leaves 5–11 mm. long, the upper ascending, the lower often arcuate-spreading, subulate, with a prominent midrib and thickened margins, narrowed to the pungent apex, glabrate above, more or less woolly toward the base, glabrate above; flowers usually solitary at the ends of the branchlets, sessile or on short stout pedicels; calyx 5–9 mm. long, loosely woolly in the central portion especially on the margins of the lobes, the subulate and pungent lobes longer than the tube; corolla bright lilac to white, tube 10–13 mm. long, the broadly obovate lobes 5–6 mm. long; style 3–7 mm. long.

Dry rocky or sandy ground, Arid Transition and Upper Sonoran Zones; eastern base of the Cascades, from Klickitat County, Washington, to Modoc County, California, east to Montana, Wyoming, northern Nevada, and Utah. Type locality: "On the Cedar Mountains, south of the Great Salt Lake." April–July.

13. *Phlox lanata* Piper. Woolly Phlox. Fig. 3923.

Phlox lanata Piper, Bull. Torrey Club 29: 643. 1902.

Low densely tufted with a short woody caudex, the seasonal branches about 2 cm. long. Leaves subulate, erect and more or less appressed, or sometimes recurved-spreading, cuspidate, distinctly bisulcate, about 5 mm. long, glabrous above, conspicuously white-woolly below; flowers solitary at the ends of the branches; calyx white-woolly except near the tip, 6–7 mm. long, the lobes cuspidate; corolla-tube 10–18 mm. long, pubescent within near the base; lobes suborbicular, purple or white, about 4 mm. long; style about 2.5 mm. long.

Mostly on rocky ridges, Upper Sonoran and Arid Transition Zones; Crook County, Oregon, south to northern Nevada and east to southern Idaho. Type locality: Steen Mountains, 4,000-foot altitude, Oregon. April–July.

14. *Phlox bryoides* Nutt. Moss Phlox. Fig. 3924.

Phlox bryoides Nutt. Journ. Acad. Phila. II. 1: 153. 1848.

Plants very compactly pulvinate, 5–10 cm. broad. Leaves closely imbricated, completely concealing the internodes and making the stems appear 4-sided, oblong, 3–5 mm. long, very woolly-tomentose toward the base, upper side concave, the lower 3-ribbed by the shiny-white midrib and the prominently thickened margins; flowers solitary, sessile; calyx about 5 mm. long; corolla white or lilac, the tube 7–10 mm. long, the lobes oblong-ovate, 3–4 mm. long; style 4 mm. long.

Dry slopes and plains, usually in rocky or stony ground, Upper Sonoran and Arid Transition Zones; eastern Lake County, Oregon, south to Nevada and to Wyoming and southern Utah. Type locality: "On the dividing ridge of the Rocky Mountains." May.

15. *Phlox gracilis* (Hook.) Greene. Slender Phlox. Fig. 3925.

Gilia gracilis Hook. Bot. Mag. 56: pl. 2924. 1829.

Collomia gracilis Dougl. ex Hook. loc. cit., as a synonym.

Phlox gracilis Greene, Pittonia 1: 141. 1887.

Microsteris gracilis Greene, op. cit. 3: 300. 1898.

Microsteris glabella Greene, op. cit. 301.

Microsteris stricta Greene, op. cit. 302.

Annual with usually erect stems 1–2 dm. high, generally simple below and sparsely to freely branching above, glandular-pubescent above, glabrous or sparsely tomentose toward the base. Lower leaves opposite, the seed-leaves often hirsute, persistent, suborbicular, the lowest three leaves often oblong or obovate, the upper linear, 2–4 cm. long, obtuse or acutish, glandular-pubescent to glabrate; inflorescence cymosely branched, very glandular; calyx 5–6 mm. long, the lobes about equaling the tube, the membranous sinus of the tube ruptured early by the expanding capsule; corolla 9–12 mm. long, with pink or purplish lobes and usually yellow tube.

Moist, grassy slopes and bottom-lands, Upper Sonoran and Transition Zones; British Columbia south on both sides of the Cascades in Washington and Oregon, and mainly west of the Sierra Nevada to southern California. Type locality: garden plant grown from collections made by Douglas "on light soils, on the banks of the Spoken river [Washington], and on high grounds near Flathead river [Idaho], in North-West America." May–Aug.

Phlox gracilis subsp. *humilis* (Greene) H. L. Mason. (*Collomia gracilis* var. *humilior* Hook. Fl. Bor. Amer. 2: 76. 1840; *C. humilis* Dougl. ex Hook. loc. cit., as a synonym; *C. micrantha* Kell. Proc. Calif. Acad. 3: 18. 1863; *Microsteris humilis* Greene, Pittonia 3: 301. 1898; *Gilia microsteris* Piper in Piper & Beattie, Fl. Palouse Reg. 142. 1901.) Low and diffusely branched from the base, the plant usually as broad as high, more or less caespitose with a short glandular pubescence; corolla 5–6 mm. long, the limb purplish, 2 mm. or less in width, tube nearly white. Mainly east of the Cascades and the Sierra Nevada, British Columbia to the San Bernardino Mountains, California, east to Montana and Utah and northern Arizona. Type locality: not given.

5. *LINÁNTHUS* Benth. Bot. Reg. 19: under pl. 1622. 1833.

Erect or spreading annuals or perennials, stem simple, or divaricately or dichotomously branched. Leaves opposite, palmately parted into 3–11 linear segments, rarely simple, then linear-filiform. Inflorescence from open-cymose to congested in heads at the ends of the branches, sometimes also solitary or in clusters in the forks of the cyme. Flowers sessile, subsessile or on long slender pedicels. Calyx usually deeply cleft, the proper tube absent or



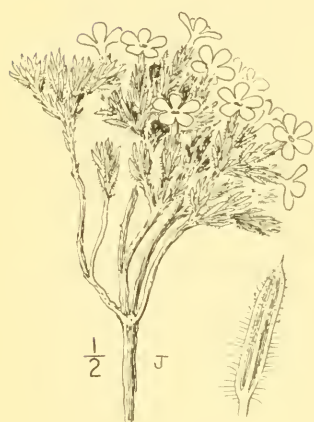
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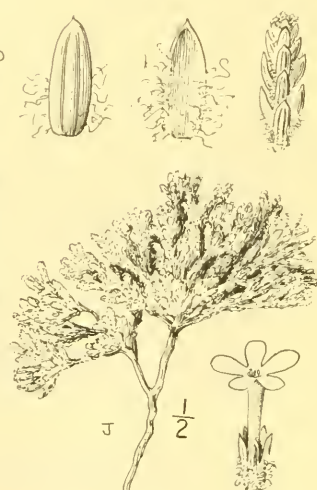
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3916. *Phlox aculeata*3917. *Phlox austromontana*3918. *Phlox Douglasii*3919. *Phlox caespitosa*3920. *Phlox Covillei*3921. *Phlox diffusa*3922. *Phlox canescens*3923. *Phlox lanata*3924. *Phlox bryoides*



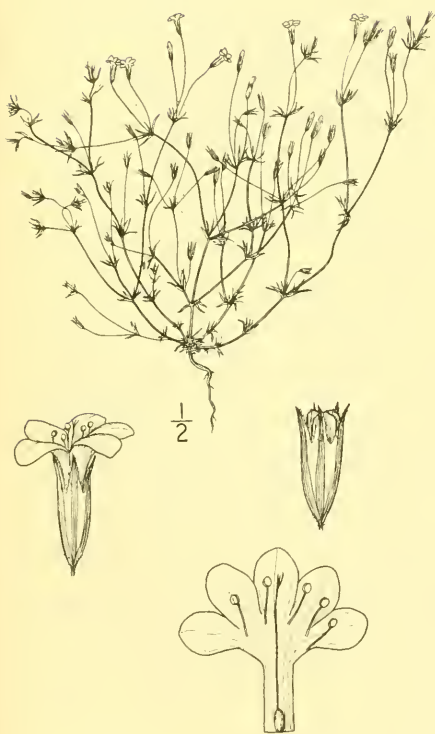
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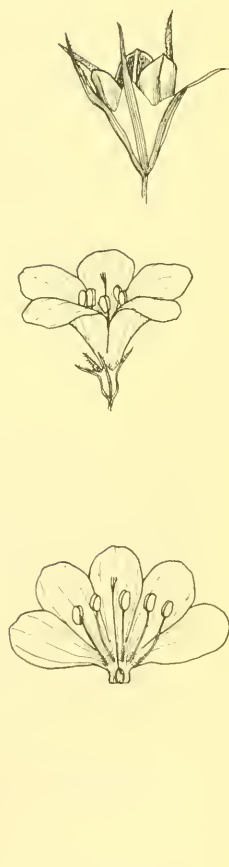
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3925. *Phlox gracilis*
3926. *Linanthus Harknessii*

3927. *Linanthus pygmaeus*
3928. *Linanthus septentrionalis*

3929. *Linanthus liniflorus*

very short, with or without a pseudotube, sometimes the margins of the free lobes with a hyaline border. Corolla from campanulate, or short-funnelform to almost salverform with a long slender tube, and a short ample throat, though never strictly salverform, pubescent or glabrous within and without, sometimes the hairs aggregated into definite bands within the tube and occasionally on the throat. Stamens equally inserted on the throat, rarely on the tube; filaments equal in length, rarely unequal, glabrous or hairy at the base, included or exserted. Pistil from short and included in the tube to very long-exserted, stigma 3-lobed. Capsule from ellipsoid to oblong-cylindrical; locules adhering at base on dehiscence and campanulately spreading, 1- to several-seeded. Seeds very unlike in their reaction to water, some producing spiracles, some mucilage and others unaffected. [Name Greek, meaning flax and flower, in allusion to the resemblance of some of the flowers to those of flax.]

About 35 species from southern British Columbia to Texas and northern Mexico, including Guadalupe, Cedros, and Socorro Islands; also in Chile. Type species, *Linanthus dichotomus* Benth.

Calyx with a conspicuous hyaline membrane in the sinuses of the lobes often forming a pseudotube superimposed above the herbaceous tube or in lieu of the herbaceous calyx-tube, or the membrane only on the margins of the lobes, the lobes then free.

Flowers terminal on slender pedicels or scattered in the axils of leaves or branches.

Inflorescence variously cymose; if dichotomous, then the flowers on long slender pedicels; flowering not vespertine, i.e., not opening in the evening.

Corolla barely exceeding the calyx, glabrous within; filaments glabrous.

Ovules 1 to each locule; high montane.

1. *L. Harknessii*.

Ovules 2-3 to each locule; foothills.

2. *L. pygmaeus*.

Corolla 2-5 times calyx with a hairy ring within or the filaments hairy at the base.

Filaments hairy at the base or the corolla hairy within at the point of insertion of the stamens.

Corolla 2-4 mm. long; hairs usually on throat at point of insertion of stamens, rarely on the base of the filaments; stems erect, branched above base; Great Basin and bordering mountain slopes.

3. *L. septentrionalis*.

Corolla 4-15 mm. long, hairs on the base of the filaments.

Stems simple below, branched above; corolla 6-15 mm. long; widespread; north Great Basin to southern California.

4. *L. limiflorus*.

Stems diffusely trichotomous from base; corolla 4-7 mm. long; rolling plains and foothills of the Sierra Nevada and North Coast Ranges, California.

5. *L. filipes*.

Filaments glabrous; the hairy ring of the corolla on the tube below the point of insertion of the stamens.

Stamens inserted in or just below the sinuses of the corolla-lobes.

Corolla yellow or rarely white, the tube included in the calyx; southern California.

Flowers in glomerules, subsessile or sessile; corolla cream-yellow.

6. *L. Lemmonii*.

Flowers in open cymes, pedicelled; corolla golden-yellow (or white in subsp. *decora*).

7. *L. aureus*.

Corolla pink, blue, lilac, or white, sometimes bicolored or tricolored, the tube exserted or included.

Corolla 6-10 mm. long; filaments 1-2 times the anthers; Sierra Nevada and North Coast Ranges to Washington.

8. *L. Bakeri*.

Corolla 10-15 mm. long, filaments much longer than anthers; Mount Hamilton to San Benito County, California.

9. *L. ambiguus*.

Stamens inserted on the throat considerably below the sinuses of the corolla-lobes.

Corolla-tube usually exserted; stamens inserted near the base of the throat; Lake and Mendocino Counties to Trinity County, California.

10. *L. Rattanii*.

Corolla-tube and often the base of the throat included; stamens inserted near middle of the throat; Lake and Mendocino Counties to Mount Diablo, California.

11. *L. Bolanderi*.

Inflorescence a regular dichotomous cyme, the flowers sessile or subsessile at the ends of the branches or in the forks of the cyme; flowering vespertine, i.e., opening in the evening and closing in the morning (except a subsp. of *L. dichotomus*).

Calyx glabrous; plants 5-30 cm. high; testa of the seed bladdery hyaline and membranous at least on the angles; seed ellipsoid, depression at the hylum inconspicuous; corolla white with a brownish tint on the back or pure white, rarely yellow; deserts and foothills of the Great Valley, California.

Filaments of the stamens with a hairy pad at the base; leaves palmately divided; corolla-limb 2-3 cm. broad in anthesis.

12. *L. dichotomus*.

Filaments of the stamens glabrous throughout; leaves simple, rarely with 2 or 3 lobes; corolla-limb rarely over 1.5 cm. broad in anthesis.

13. *L. Bigelovii*.

Calyx pubescent; plants 2-10 cm. high; testa of the seed not bladdery nor hyaline, closely investing the seed; seed reniform or subreniform, deeply constricted at the hylum; corolla commonly yellow; southwestern deserts.

Leaves simple; calyx glandular-pubescent externally; stamens inserted on corolla-tube.

14. *L. Jonesii*.

Leaves 3-lobed or rarely simple; calyx glabrous externally, the lobes pilose or villose within; stamens inserted at the base of the corolla-throat.

15. *L. arenicola*.

Flowers aggregated into heads or geminate in small clusters.

Corolla campanulate to short-funnelform, the tube rarely equaling the throat.

Petals with a process or fold at the base, blue, white, or yellow; internodes short, usually concealed by the leaves.

16. *L. Parryae*.

Petals without processes or folds; internodes often very long, not usually concealed by leaves.

Calyx-lobes united by their bordering membranes to form a pseudotube.

Membranes of the calyx-lobes united only below, bordering the free lobes above; flowers pink to lilac or rose, rarely white; internodes very long.

Filaments of the anthers glabrous below; flowers sessile; leaves 3-cleft, 2-3 mm. long.

17. *L. bellus*.

- Filaments of anthers hairy below; flowers on pedicels; leaves entire, 5–20 mm. long.
18. *L. dianthiflorus*.
- Membranes of the calyx-lobes united their full length and truncate across the top; flowers white.
19. *L. concinnus*.
- Calyx-lobes free to base, membrane-margined; leaves subequal to exceeding internodes but not concealing them.
20. *L. demissum*.
- Corolla funnelliform to salverform, the tube 1–2 mm. thick, usually much longer than the throat.
Corolla funnelliform, the tube very stout.
- Membrane of the calyx-lobes forming a tube only toward the base, the membrane continuing up the free portion of the sepal to near its tip; corolla glabrous within.
- Corolla 10–15 mm. long, the tube barely exerted from the calyx; stamens inserted at the base of the throat.
21. *L. Killipii*.
- Corolla 15–25 mm. long, the tube usually long-exserted from the calyx; stamens inserted at the middle of the throat.
22. *L. Orcuttii pacificus*.
- Membrane of the calyx-lobes united nearly their full length, free portion of the lobes not margined; corolla with a hairy ring within tube.
23. *L. grandiflorus*.
- Corolla salverform to long-funnelform, the tube very slender and threadlike, often 2 or more times the calyx.
- Bracts of the inflorescence short-hispid, hirsute or pilose, never coarsely ciliate.
- Corolla 10–30 mm. long, the lobes rounded, the tube usually darker than the lobes; stamens barely exerted, not exceeding the style; filaments 2–3 times the anther; leaf-segments linear.
- Sinuses of the bract-lobes not membranous, the lobes hirsute; corolla-tube glabrous, 2.5–3 times the calyx.
24. *L. breviculus*.
- Sinuses of bract-lobes half-filled with a scarious membrane, the lobes villous-ciliate; corolla-tube 1–2 times the calyx.
25. *L. nudatus*.
- Corolla 6–10 mm. long, the lobes truncate or emarginate, tube and lobes white; stamens exerted beyond the style; filaments 3–5 times the anther; leaf-segments oblanceolate.
26. *L. tularensis*.
- Bracts of the inflorescence coarsely and often densely hispid-ciliate.
- Corolla-lobes 2–3 mm. long, occasionally with a purple spot at the base, the tube glabrous.
27. *L. ciliatus*.
- Corolla-lobes 5–8 mm. long, usually with a purple spot at the base, the tube pubescent.
28. *L. montanus*.
- Calyx, if membranous, then inconspicuously so, the proper calyx-tube herbaceous and with no evident pseudotube, the lobes never membrane-margined; corolla salverform with an ample short throat.
- Plants annual.
- Corolla-lobes 5–8 mm. long.
- Corolla-tube 1.5–2 times the calyx, rarely more than 1 cm. long; locules of capsule 1–3-seeded; seeds smooth; a very uniform species.
29. *L. serrulatus*.
- Corolla-tube 2–6 times the calyx, rarely less than 2 cm. long; locules of capsule 3–6-seeded; seeds rugose; a very polymorphic species.
30. *L. androsaceus*.
- Corolla-lobes 3–5 mm. long.
- Corolla pink or sometimes white, the throat and tube yellow; frequently the middle lobe of lower leaves oblanceolate; stigma-lobes mostly less than 1 mm. long.
31. *L. bicolor*.
- Corolla yellow throughout; leaf-lobes uniformly linear, acicular; stigma-lobes 2–4 mm. long.
32. *L. acicularis*.
- Plants perennial.
- Flowers sessile or subsessile in head-like cymes; leaf-whorls compact and rigid (intergrading with the next).
33. *L. Nuttallii*.
- Flowers subsessile to long-pedicelled; leaf-whorls more open and lax.
34. *L. floribundus*.

1. *Linanthus Harknessii* (Curran) Greene. Harkness' *Linanthus*. Fig. 3926.

Gilia Harknessii Curran, Bull. Calif. Acad. 1: 12. 1884.

Navarretia Harknessii Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus Harknessii Greene, Pittonia 2: 255. 1892.

Gilia pharnaceoides var. *Harknessii* M. E. Jones, Contr. West. Bot. No. 12: 55. 1908.

Erect annual, 5–15 cm. high; stems branching well above the base, puberulent to glabrate. Leaves 3–5 parted into linear lobes 6–15 mm. long, glabrate to minutely hirsute; flowers on slender filiform pedicels subtended by simple or 3–5-parted bracts in a cymose or dichotomous panicle; calyx subequal to corolla, deeply cleft into linear segments 2–3 mm. long, sinuses about half-filled with a narrow hyaline membrane which flanks the lobes above; corolla short-funnelform, white to pale blue, tube short, glabrous within, lobes subequal to tube and throat; stamens inserted at base of throat, anther included, filaments glabrous; stigma included; capsule-locules 1-seeded.

Open gravelly slopes, Arid Transition and Boreal Zones; Coast Ranges and Sierra Nevada from Lake and Fresno Counties, California, northward on the west side of the Cascades to Washington. Type locality: "summit of the Sierra Nevada" (Donner Pass). June–Aug.

Linanthus Harknessii subsp. *condensatus* H. L. Mason, Madroño 9: 250. 1948. Low, densely branched; corolla exceeding calyx; stamens subsessile, inserted midway on throat. Type locality: Plaskett Meadows, Glenn County, California. Not otherwise known.

2. *Linanthus pygmaeus* (Brand) J. T. Howell. Pigmy *Linanthus*. Fig 3927.

Gilia pygmaea Brand, Pflanzenreich 4250: 134. 1907.

Linanthus pygmaeus J. T. Howell, Leaflets West. Bot. 2: 100. 1938.

Erect or diffuse annual, 2–10 cm. high; stems slender, filiform, wiry, minutely pilose-hispidulous to glabrate. Leaves 3–5-cleft into linear, setose, hairy or hispid lobes, sometimes the middle lobe longer and lanceolate; flowers solitary on capillary pedicels, erect; calyx cylindrical, deeply cleft into linear, minutely pilose, hispid lobes, sinuses over half-filled by a hyaline membrane, distended but not ruptured by the growing capsule; corolla narrowly funnelliform, 3–5 mm. long,

scarcely longer than calyx, white to pale blue, throat very narrow, half as long as tube; stamens inserted about midway on throat, subequal petals, filaments glabrous; pistil 4 mm. long; capsule-locules several-seeded.

Interior valleys and foothills, Upper Sonoran Zone; from Butte County, California, to Lower California; Guadalupe Island. Type locality: Guadalupe Island, Lower California. April-June.

3. *Linanthus septentrionalis* H. L. Mason. Northern *Linanthus*. Fig. 3928.

Linanthus septentrionalis H. L. Mason, *Madroño* 4: 159. 1938.

Linanthus Harknessii var. *septentrionalis* Jepson & Bailey in Jepson, *Fl. Calif.* 3: 210. 1943.

Erect annual, 5-30 cm. high, stems simple or branched above. Leaves 5-7-cleft into linear, hispidulous or glabrate segments 5-20 mm. long; flowers solitary on filiform pedicels; calyx deeply cleft into linear-lanceolate segments, hispidulous or glabrate, sinuses about one-half filled with a hyaline membrane which flanks the lobes above toward the tips; corolla short-funnelform, 1.5 times the calyx, 1-4 mm. long, white to pale blue, throat shorter than tube, with a hairy ring at or above the point of insertion of stamens, or rarely glabrous, lobes campanulately spreading; stamens inserted on the base of throat, 2-3 times as long as throat, equal, exserted, filaments glabrous or with a few hairs at the base; stigma exserted, lobes up to 1 mm. long; capsule cylindric, locules 2-4-seeded.

Gravelly clearings, Arid Transition Zone; east of the Sierra Nevada and Cascade Mountains to the Rocky Mountains, south to southern Utah, north to central British Columbia. Type locality: "Camp Roosevelt, Tower Junction, Yellowstone National Park, Wyoming." May-July.

4. *Linanthus liniflorus* (Benth.) Greene. Flax-flowered *Linanthus*. Fig. 3929.

Gilia liniflora Benth. *Bot. Reg.* 19: under *pl.* 1622. 1833.

Navarretia liniflora Kuntze, *Rev. Gen. Pl.* 2: 433. 1891.

Linanthus liniflorus Greene, *Pittonia* 2: 254. 1892.

Dactylophyllum liniflorum Heller, *Muhlenbergia* 2: 209. 1906.

Gilia liniflora subsp. *eu-liniflora* Brand, *Pflanzenreich* 4²⁰⁰: 133. 1907.

Erect annual, 1-6 dm. high; stems with wiry internodes, branching well above the base, branching usually alternate (opposite in subspecies), glabrous to puberulent, rarely villous. Leaves 3-9-cleft into linear segments 1-3 cm. long; flowers on slender pedicels in a cymose panicle, bracts leaf-like but reduced; calyx 3-4 mm. long, cleft to base into linear lobes, often pilose-ciliate to villous or wholly glabrous, sinuses about two-thirds filled with a broad hyaline membrane; corolla short-funnelform, 1-3 cm. long, white to light pink or pale blue, throat 3-4 times the tube (1-2 times in subspecies), lobes obovate with conspicuous veins; stamens inserted on the base of the throat, exserted, filaments with a tuft of hairs on the base; style exserted, stigma-lobes about 1 mm. long; capsule obovoid, locules 1-2 seeded.

Scattered localities from Monterey to San Francisco Bay region, California; much less common than the subspecies. Type locality: "California," presumably Monterey. Collected by Douglas. April-July.

Linanthus liniflorus subsp. *pharnaceoides* (Benth.) H. L. Mason. (*Gilia pharnaceoides* Benth. *Bot. Reg.* 19: under *pl.* 1622. 1833; *G. liniflora* var. *pharnaceoides* A. Gray, *Proc. Amer. Acad.* 8: 263. 1870; *G. tenella* Nutt. ex A. Gray, loc. cit., as a synonym; *Linanthus pharnaceoides* Greene, *Pittonia* 2: 254. 1892; *L. liniflorus* var. *vallicola* Jepson, *Man. Fl. Pl. Calif.* 803. 1925.) Differs from the typical species in the smaller corolla, the throat shorter in proportion to the tube and the characteristically cymose branching in which the branches are opposite; intergrades with the typical species. Very common in the northern Great Basin region from eastern Washington and Idaho south through eastern Oregon into the Coast Ranges of California (reaching the coast from Monterey County to Santa Barbara County), south to Lower California; western Mojave Desert, southern Sierra Nevada foothills, rare in northern Sierra Nevada foothills. Type locality: "California." Collected by Douglas.

5. *Linanthus filipes* (Benth.) Greene. Filiform *Linanthus*. Fig. 3930.

Gilia filipes Benth. *Pl. Hartw.* 325. 1849.

Gilia pusilla var. *californica* A. Gray, *Proc. Amer. Acad.* 8: 263. 1870.

Linanthus filipes Greene, *Pittonia* 2: 255. 1892.

Linanthus pusillus var. *californicus* Milliken, *Univ. Calif. Pub. Bot.* 2: 50. 1904.

Gilia liniflora subsp. *pharnaceoides* var. *filipes* Brand, *Pflanzenreich* 4²⁰⁰: 134. 1907.

Diffusely spreading annual, 5-15 cm. high, stems filiform, cymosely branched, puberulent or more rarely villous below. Leaves 5-cleft into linear-subulate segments, 3-6 mm. long; flowers on long filiform pedicels in open cymes; calyx deeply cleft into linear hispidulous segments, sinuses about two-thirds filled with a hyaline membrane; corolla funnelform, 3-6 mm. long, white, pink or lilac, sometimes the throat yellow, tube short, glabrous within; stamens inserted at base of throat, anthers exserted, filaments hairy at base; stigma exserted, lobes 1 mm. long; capsule-locules several-seeded.

Foothills and rolling plains, Upper Sonoran Zone; Solano County to Humboldt, Trinity, and Shasta Counties, south in the Sierra Nevada to Kern County, California. Type locality, Sacramento Valley. April-July.

6. *Linanthus Lemmonii* (A. Gray) Greene. Lemmon's *Linanthus*. Fig. 3931.

Gilia Lemmonii A. Gray, *Syn. Fl. N. Amer.* 2¹: 394. 1878.

Navarretia Lemmonii Kuntze, *Rev. Gen. Pl.* 2: 433. 1891.

Linanthus Lemmonii Greene, *Pittonia* 2: 257. 1892.

Spreading or erect annual, 5-15 cm. high, herbage puberulent to canescent. Leaves 3-5-cleft into linear divisions 2-5 mm. long; flowers sessile or subsessile in terminal or axillary cymes; calyx deeply cleft into linear-hispid puberulent lobes, sinuses about half-filled with a hyaline membrane forming an evident pseudotube; corolla short-funnelform, 5-8 mm. long, cream-white

or dull yellow, tube included in calyx, a hairy ring within at summit; stamens inserted on throat just beneath sinuses of corolla-lobes, about half as long as petals, filaments glabrous; stigma long-exserted; capsule-locules many-seeded.

Mountain valleys and mesas, Arid Transition and Upper Sonoran Zones; San Bernardino Valley south through western Riverside and eastern San Diego Counties, California, to Lower California. Type locality: "S.E. California, in San Bernardino Co." April-July.

7. *Linanthus aureus* (Nutt.) Greene. Desert Gold. Fig. 3932.

Gilia aurea Nutt. Journ. Acad. Phila. II. 1: 155. 1848.

Leptosiphon aureus Benth. ex. Vilm.-Andr. Fl. Pl. Terre ed. 2. 470. 1866.

Navarretia aurea Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus aureus Greene, Pittonia 2: 257. 1892.

Dactylophyllum aureum Heller, Muhlenbergia 2: 231. 1906.

Erect or spreading annual, 5-10 cm. high, often spreading to 20 cm., lower internodes short, upper wiry elongate, glabrous to hispid or stipitate-glandular, branching cymose. Leaves 3-cleft into linear mucronate segments, 3-6 mm. long; flowers on slender pedicels in an open cyme; calyx deeply cleft, sinuses about two-thirds filled with a hyaline membrane, glabrate to hispid or stipitate-glandular, lobes short-villous above toward tips; corolla campanulate to short-funnelform, 6-12 mm. long, golden to pale yellow, often with purple spots in the throat, tube included in calyx, shorter than throat, with a hairy ring within at its juncture with throat; stamens inserted on upper half of throat, barely exserted from orifice; stigma exserted, about one-third as long as style; capsule several-seeded.

Desert washes and sandy slopes, 500 to 6,000 feet, Sonoran Zones; Ventura and Inyo Counties, California, south to Lower California, east to Nevada and New Mexico. Type locality: "Santa Barbara." April-June.

Linanthus aureus subsp. *decòrus* (A. Gray) H. L. Mason. (*Gilia aurea* var. *decora* A. Gray, Proc. Amer. Acad. 8: 264. 1874.) A larger flowered variant with cream-white flowers and usually with a dark throat. Growing in scattered localities throughout the Mojave Desert, California. Type locality: "California." Collected by Fremont.

8. *Linanthus Bakeri* H. L. Mason. Baker's Linanthus. Fig. 3933.

Gilia Bolanderi Brand, Pflanzenreich 4²⁰⁰: 134. 1907. As to specimens cited, not A. Gray.

Linanthus Bakeri H. L. Mason, Madroño 9: 249. 1948.

Erect slender annual, 6-25 cm. high, internodes wiry, 3-7 times the leaves, glandular-puberulent below the nodes and on pedicels, branching cymose, not profuse. Leaves 3-7-parted into linear lobes; flowers on long slender pedicels in an irregular cymose panicle; calyx deeply cleft into linear lobes, these puberulent above toward the tips, sinuses about half-filled with a narrow hyaline membrane which becomes distended by the growing capsule; corolla slender-funnelform, 6-10 mm. long, white, pink, lilac or violet, sometimes with a definite zoning, tube usually exserted, rarely included, 1-4 times the throat, with a narrow hairy band within, rarely glabrous, tube and throat usually puberulent exteriorly, throat narrow, lobes 2-3 mm. long; stamens inserted in the sinuses of corolla-lobes or just below, one-half as long as corolla-lobes, filaments glabrous, 1-2 times the anthers; stigma exserted from orifice of throat, lobes about 1 mm. long; capsule oblong cylindric, locules several-seeded.

Fresno County and Mount Diablo, north in the Coast Ranges and Sierra Nevada, California, to Klickitat County, Washington. Type locality: Pilot Hill, Eldorado County, California. April-July.

9. *Linanthus ambiguus* (Rattan) Greene. Serpentine Linanthus. Fig. 3934.

Gilia ambigua Rattan, Bot. Gaz. 11: 339. 1886.

Linanthus ambiguus Greene, Pittonia 2: 256. 1892.

Gilia Bolanderi var. *ambigua* Brand, Pflanzenreich 4²⁰⁰: 135. 1907.

Dactylophyllum ambiguum Heller, Muhlenbergia 2: 309. 1907.

Linanthus Rattanii var. *ambiguus* Jepson, Fl. Calif. 3: 210. 1943.

Erect annual, 6-15 cm. high, stems simple or branched from the base, glabrous or hairy, sometimes with gland-tipped hairs below nodes. Leaves 3-7-cleft into linear minutely hispid lobes; flowers solitary on slender pedicels in an open cymose panicle; calyx cylindrical, 3-6 mm. long, deeply cleft into linear lobes, sinuses nearly filled with a narrow hyaline membrane forming an evident pseudotube, the proper tube not over 1 mm. long, lobes pilose-hispid, often villous above toward tips; corolla funnelform, 9-12 mm. long, color distinctly zoned, tube yellow or white, throat purple, lobes pink to blue with a yellow band at base, tube with a broad hairy band within on upper half; stamens inserted just below sinuses of corolla-lobes, one-half to three-fourths as long as lobes; pistil about equaling corolla, stigma exserted, lobes 2-3 mm. long; capsule cylindric, locules several-seeded.

Largely on serpentine soil, Upper Sonoran Zone; south central California in Mount Hamilton and San Benito Ranges and the eastern foothills of the Santa Cruz Mountains. Type locality: "Oak Hill, four miles south of San Jose." April-June.

10. *Linanthus Rattanii* (A. Gray) Greene. Rattan's Linanthus. Fig. 3935.

Gilia Rattanii A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 407. 1886.

Navarretia Rattanii Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus Rattanii Greene, Pittonia 2: 257. 1892.

Erect annual, 6-20 cm. high; stems simple or branched, pilose to glabrate. Leaves 3-7-cleft into linear segments 4-6 mm. long; flowers solitary on slender wiry pedicels arranged in a cymose panicle; calyx cylindrical, deeply cleft into linear 3-nerved lobes, pilose-hispid to glabrous, sinuses nearly filled with a narrow hyaline membrane; corolla slender-funnelform to



3932



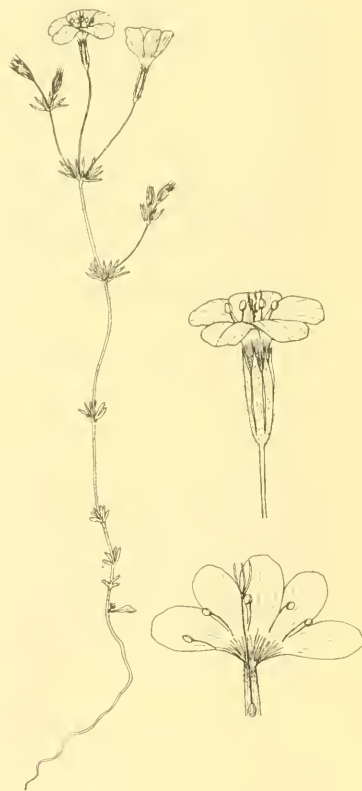
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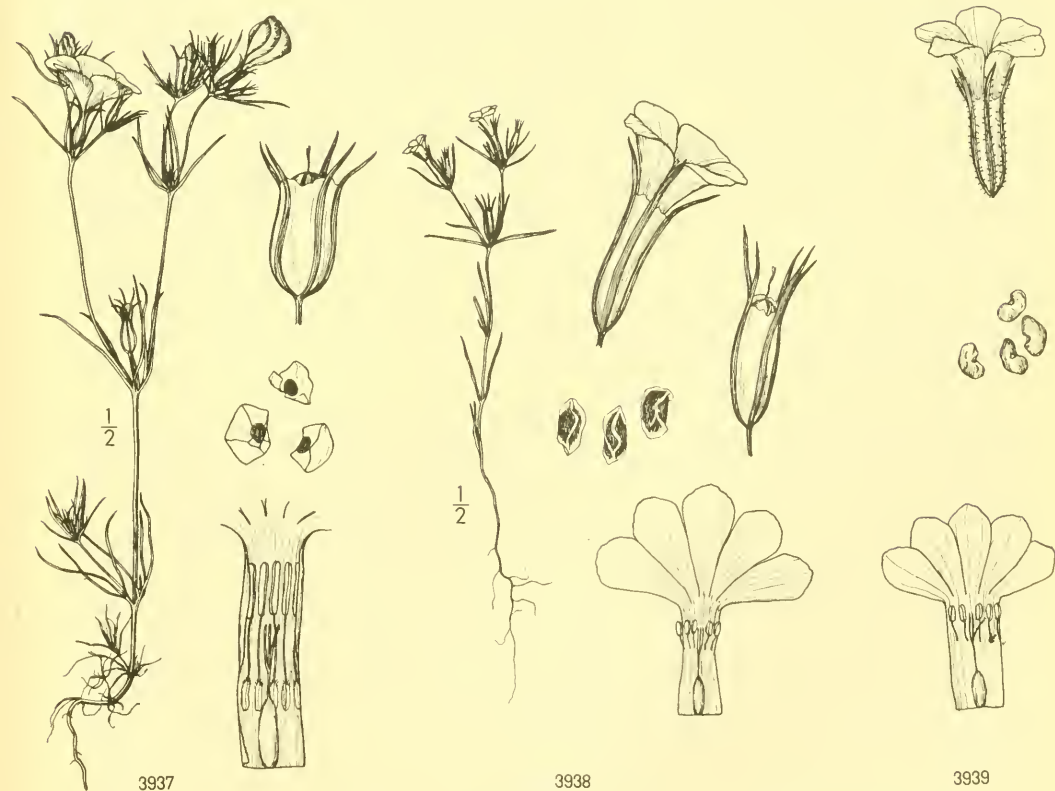
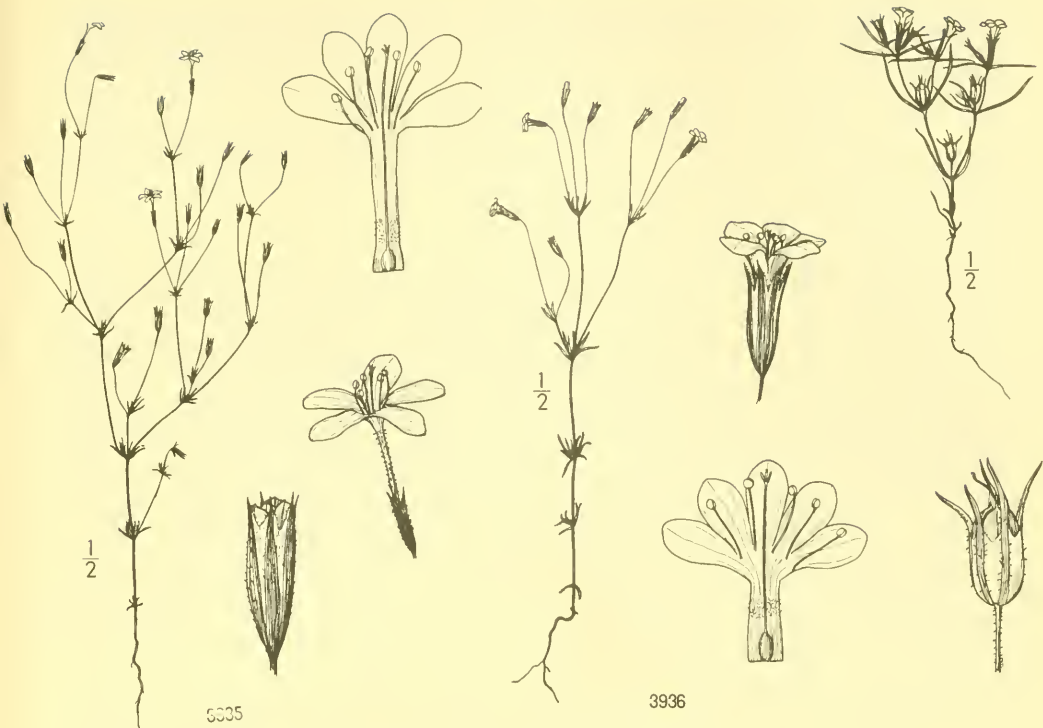


3934

3930. *Linanthus filipes*
 3931. *Linanthus Lemmonii*

3932. *Linanthus aureus*
 3933. *Linanthus Bakeri*

3934. *Linanthus ambiguus*



3935. *Linthanthus Rattanii*
3936. *Linthanthus Bolanderi*

3937. *Linthanthus dichotomus*
3938. *Linthanthus Bigelovii*

3939. *Linthanthus Jonesii*

salverform, 10–15 mm. long, lilac, pink or white, tube 1.5–2 times calyx, a hairy band at base within, throat short, ample; stamens inserted at base of throat, 4 times throat, long-exserted, filaments glabrous; style long-exserted, stigma about 1 mm. long; capsule cylindric, locules several-seeded.

Inner Coast Ranges, Lake County to Tehama County and eastern Mendocino County, California. Type locality: "On a mountain north of Clear Lake, California." May–June.

11. *Linanthus Bolanderi* (A. Gray) Greene. Bolander's *Linanthus*. Fig. 3936.

Gilia Bolanderi A. Gray, Proc. Amer. Acad. 8: 263. 1870.

Navarretia Bolanderi Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus Bolanderi Greene, Pittonia 2: 255. 1892.

Erect slender annual, 5–15 cm. high, simple below or branched from the base, herbage glandular-pilose to glabrate. Leaves 3–7-cleft into linear lobes 3–8 mm. long, hispidulous; flowers solitary on slender pedicels in an open cyme; calyx deeply cleft into linear segments, glabrate or the lobes hirsutulous above toward tips, sinuses amply filled with a hyaline membrane forming a pseudotube one-half to four-fifths the calyx; corolla funnelform, 6–10 mm. long, white to pale blue or lilac, rarely bicolored, then the throat yellow, tube included, rarely slightly exserted, a hairy ring within, lobes obovate; stamens inserted on the upper half of the throat, 1.5 times the throat, filaments glabrous, 6–8 times the anther; stigma exserted, about 1 mm. long; capsule ellipsoid, locules several-seeded.

Upper Sonoran Zone to lower Arid Transition Zone; Inner North Coast Ranges, California. Type locality: "Sonoma County, on dry hills; Russian River" (Ukiah, Mendocino County). April–May.

12. *Linanthus dichotomus* Benth. Evening Snow. Fig. 3937.

Linanthus dichotomus Benth. Bot. Reg. 19: under *pl.* 1622. 1833.

Gilia Linanthus Steudel, Nom. ed. 2: 1: 683. 1840.

Gilia dichotoma Benth. in A. DC. Prod. 9: 314. 1845.

Navarretia dichotoma Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Gilia dichotoma var. *uniflora* Brand, Pflanzenreich 4²⁵⁰: 144. 1907.

Gilia dichotoma var. *integra* M. E. Jones, Contr. West. Bot. No. 12: 53. 1908.

Erect, simple or branched annual, stems usually glabrous and somewhat glaucous, 5–20 cm. high. Leaves palmately 3–5-parted, rarely simple and entire; inflorescence a dichotomous cyme, flowers vespertine, solitary in the forks on erect pedicels; calyx with a broad membranous tissue between the lobes, truncate above and forming a pseudotube; corolla funnelform, the tube included in the calyx, throat very short, lobes convolute in the bud, obovate, entire or erose, white or with a brown or purple pigment on that portion of the back exposed when closed; stamens inserted on the lower part of the tube, included, filaments dilated into a hairy pad at base; style short, stigma deeply 3-parted, included below anthers; capsule several-seeded, seeds with a loose membranous coat.

Valleys and hills, mainly Upper Sonoran Zone; South Coast Ranges and southern Sierra Nevada, California; mountains of southern California; western Colorado Desert, Mojave Desert north through Inyo County, California, to south central Nevada, east to Arizona. Type locality: "California." Collected by Douglas. April–June.

Linanthus dichotomus subsp. *meridiānus* (Eastw.) H. L. Mason. (*Linanthus dichotomus* var. *meridianus* Eastw. Leaflets West. Bot. 4: 167. (1945.)) Like the species except that it flowers during the day; is wholly white and fragrant. Serpentine outcrops of northern California. Type locality: 8 miles south of Pope Valley Store, Napa County, California.

13. *Linanthus Bigelovii* (A. Gray) Greene. Bigelow's *Linanthus*. Fig. 3938.

Gilia dichotoma var. *parviflora* Torr. Bot. Mex. Bound. 2: 147. 1859.

Gilia Bigelovii A. Gray, Proc. Amer. Acad. 8: 265. 1870.

Navarretia parviflora Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus Bigelovii Greene, Pittonia 2: 253. 1892.

Erect annual, 1–3 dm. high, simple or dichotomously branched, glabrous. Leaves linear, entire or 2–3-cleft into linear segments 1–3 cm. long; flowers vespertine, sessile or short-pedicelled in the forks of the dichotomous cyme; calyx about 1 cm. long, cylindrical, deeply cleft into linear segments, lower two-thirds of the sinuses amply filled with a hyaline membrane which is truncate across the top; corolla narrowly funnelform, 1–1.5 cm. long, white with brownish purple tint on the backs of the petals, rarely pale yellow, tube 5–8 mm. long, continuous with the throat, lobes narrowly obovate, shorter than the tube; stamens on the upper half of the tube, 2–3 mm. long, included, glabrous; stigma included, equal to the style; capsule cylindric; seed ellipsoid, with a bladder test.

Sonoran Zones; western Stanislaus County to Ventura County, east through the Mojave and Colorado Deserts, California, to Texas. Type locality: "Cook's spring, and near Frontera, Texas." March–May.

14. *Linanthus Jonesii* (A. Gray) Greene. Jones's *Linanthus*. Fig. 3939.

Gilia Jonesii A. Gray, Syn. Fl. N. Amer. ed. 2: 2: 407. 1886.

Navarretia Jonesii Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus Jonesii Greene, Pittonia 2: 254. 1892.

Gilia Bigelovii var. *Jonesii* Brand, Pflanzenreich 4²⁵⁰: 144. 1907.

Linanthus Bigelovii var. *Jonesii* Jepson & Mason in Jepson, Man. Fl. Pl. Calif. 802. 1925.

Erect annual 2–10 cm. high, stems slender filiform, dichotomously branched throughout,

glabrous except on the pedicels and calyx. Leaves entire, filiform, 1-2 cm. long; flowers vespertine, sessile to short-pedicelled at the ends of the branches and in the axils of the cyme, pedicels beset with capitate hairs; calyx cleft to base into linear lobes, sparsely beset with gland-tipped hairs, sinuses about three-fourths filled with a broad hyaline membrane which is truncate across top and forms a conspicuous pseudotube; corolla tubular-funnelform, about 1 cm. long, yellow, tube not clearly differentiated from throat, lobes obovate; stamens inserted in corolla-tube, about 2 mm. long, included, filaments glabrous; pistil included, stigma about 1 mm. long; capsule ellipsoid, seeds reniform or sub-reniform, deeply constricted at hilum.

Desert flats and slopes, Lower Sonoran Zone; eastern Mojave and Colorado Deserts from Inyo County, California, to Lower California, east to Arizona. Type locality: "S.E. California." March-May.

15. *Linanthus arenicola* (M. E. Jones) Jepson & Bailey. Sand Linanthus. Fig. 3940.

Gilia arenicola M. E. Jones, Contr. West. Bot. No. 13: 2. 1910.

Linanthus mohavensis H. L. Mason, Madroño 4: 158. 1938.

Linanthus arenicola Jepson & Bailey in Jepson, Fl. Calif. 3: 205. 1943.

Erect annual, 1-10 cm. high, stems compactly branched, glabrous to minutely puberulent. Leaves 3- or rarely 5-cleft to above the base, rarely simple and entire, usually glabrous below, pilose above; cotyledons oblong; flowers vespertine, solitary and sessile at the ends of the branches or in the forks of the dichotomous cyme; calyx cleft into linear somewhat unequal segments, glabrous below, somewhat hirsute above toward tips, sinuses about two-thirds filled with a broad membrane, membrane growing with the capsule but at length split by it; corolla yellow, sometimes purple in throat, 5-7 mm. long, equaling or barely exceeding the calyx, at length pushed out by the growing capsule; stamens inserted on base of throat, included, filaments glabrous; stigma included, lobes equaling style; capsule cylindric, equaling calyx, locules several-seeded; seeds reniform, strongly constricted at hilum.

A gypsophilous species growing in scattered localities of the Mojave Desert and Death Valley, California, to southern Utah. Type locality: "Needles, California." March-April.

16. *Linanthus Parryae* (A Gray) Greene. Parry's Linanthus. Fig. 3941.

Gilia Parryae A. Gray, Proc. Amer. Acad. 12: 76. 1876.

Gilia Kennedyi Porter, Bot. Gaz. 2: 77. 1877.

Navarretia Parryae Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus Parryae Greene, Pittonia 2: 256. 1892.

Dactylophyllum Parryae Heller, Muhlenbergia 2: 231. 1906.

Erect annual, 2-10 cm. high, stems compactly branched, rarely openly branched, internodes short, usually concealed by leaves. Leaves 3-7-parted into linear lobes, 5-15 mm. long, puberulent to hispidulous; flowers sessile to subsessile in few-flowered cymes, bracts somewhat villous; calyx deeply cleft into linear hyaline-margined lobes, membrane united only at base forming a very short pseudotube; corolla funnelform, blue, white, cream or yellow, tube included, about one-half as long as throat, lobes 6-12 mm. long, with a reniform crest at base, margins sometimes erose-denticulate; stamens inserted at junction of tube and throat, filaments dilated at base, often with purple pigment; stigma exserted, exceeding anthers; capsule obovoid, locules many-seeded.

Sandy or gravelly soils, Sonoran Zones; deserts or semi-deserts from southeast Monterey County and Mono County south through the Mojave Desert to the north side of the San Bernardino Mountains, California. Type locality: "S.E. California, on desert plains near the head of the Mohave River." April-June.

17. *Linanthus béllus* (A. Gray) Greene. Desert Beauty. Fig. 3942.

Gilia bella A. Gray, Proc. Amer. Acad. 20: 301. 1885.

Navarretia bella Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus bellus Greene, Pittonia 2: 256. 1892.

Linanthus Peirsonii H. L. Mason, Madroño 2: 23. 1931.

Diffuse annual, 2-6 cm. high, stems filiform, wiry, cymosely branched from near the base, internodes long, giving the impression of nakedness to plant. Leaves mostly 3-cleft, rarely as much as 7-cleft or simple, sometimes the members of the pair connate at the base, lobes thick, 1-3 mm. long, sparsely villous; flowers solitary or more rarely 1-3, sessile in bracteate glomerules at the ends of filiform branches; calyx deeply cleft, the lobes margined to the tip by a hyaline membrane, each lobe with a purple spot toward the base; corolla campanulate or short-funnelform, 10-15 mm. long, lilac to pink, throat golden-yellow with a purple spot below each lobe, lobes broadly obovate, truncate, margins entire or erose-denticulate; stamens inserted near base of throat, filaments glabrous; capsule subequaling the calyx.

Sandy or gravelly soils, Lower Sonoran Zone; southeastern San Diego County and adjacent Imperial County, California, south to Lower California. Type locality: "Hanson's Ranch, Lower California, near the boundary." April-May.

18. *Linanthus dianthiflorus* (Benth.) Greene. Fringed *Linanthus*. Fig. 3943.

Fenzlia dianthiflora Benth. Bot. Reg. 19: under *pl.* 1622. 1833.

Gilia dianthoides Endl. Atakt. Bot. *pl.* 29. 1833.

Gilia Fenzlia Steudel, Nom. ed. 2. 1: 683. 1840.

Gilia dianthiflora Steudel ex Benth. in A. DC. Prod. 9: 314. 1845.

Fenzlia speciosa Nutt. Journ. Acad. Phila. II. 1: 157. 1848.

Fenzlia concinna Nutt. loc. cit.

Navarretia dianthiflora Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Gilia dianthoides alba Orcutt, W. Amer. Sci. 7: 132. 1891.

Linanthus dianthiflorus Greene, Pittonia 2: 254. 1892.

Erect, decumbent or prostrate annual, 3–15 cm. high, stems simple or much-branched, glabrous to puberulent or occasionally flocculent about the nodes. Leaves simple, entire, filiform, 5–30 mm. long; flowers solitary or in few-flowered leafy cymes, subsessile to short-pedicel; calyx deeply cleft, the lower half of the sinus filled with a hyaline membrane which ascends the lobes a short distance above the pseudotube, tips of lobes naked; corolla short-funnelform, 10–25 mm. long, lilac, pink or white with yellow throat, tube shorter than throat, puberulent within at insertion of stamens, lobes longer than tube and throat, obovate, margins denticulate-erose; stamens inserted at base of throat and equaling throat, anthers disposed in orifice of throat, filaments puberulent at base; stigma exserted, its lobes about equal the style; capsule ellipsoid, many-seeded; seeds sometimes margined on angles by a narrow flange.

Sonoran Zones; Santa Barbara to San Diego, east to western Colorado Desert, California, south to Lower California. Type locality: "California." Collected by Douglas. Feb.–May.

Linanthus dianthiflorus subsp. *farinosa* (Brand) H. L. Mason. (*Gilia dianthoides* var. *farinosa* Brand, Pflanzenreich 4250: 131. 1907.) Differs in its spatulate calyx-lobes, shorter leaves, and farinose pubescence. San Bernardino Valley and Oak Grove, San Diego County, California. Type locality: San Bernardino Valley, San Bernardino County.

19. *Linanthus concinnus* Milliken. San Gabriel *Linanthus*. Fig. 3944.

Gilia modesta Hall, Bot. Gaz. 31: 389. 1901. Not Phillippi 1895.

Linanthus concinnus Milliken, Univ. Calif. Pub. Bot. 2: 53. 1904.

Gilia Parryae var. *modesta* Brand, Pflanzenreich 4250: 145. 1907.

Gilia concinna Munz, Man. S. Calif. 396. 1935.

Erect annual, 5–15 cm. high, stems divaricately to dichotomously branched, puberulent to glabrate. Leaves 3–5-parted into linear segments, 8–15 mm. long, opposite below, subopposite or alternate in the inflorescence, sparingly beset with weak white hairs; flowers on short pedicels in terminal cymes; calyx deeply cleft into linear, sparsely pilose, somewhat spreading lobes, the sinuses about two-thirds filled with a very conspicuous broad truncate hyaline membrane forming a very evident pseudotube; corolla short-funnelform to campanulate, 10–15 mm. long, white, except for yellow tube and throat, tube 1–2 mm. long, throat narrow, 6–8 mm. long, lobes 6–8 mm. long with 2 dark lines at the base; stamens equally inserted at the base of the throat, included, filaments hairy at the base and usually one longer than the rest; stigma included; capsule ellipsoid, locules 2–3-seeded.

Dry rocky slopes, Arid Transition Zone to Upper Sonoran Zone; San Gabriel Mountains, southern California. Type locality: San Antonio Mountains, southern California, 6,000 feet altitude. June–July.

20. *Linanthus demissus* (A. Gray) Greene. Desert *Linanthus*. Fig. 3945.

Gilia Dactylophyllum Torr. Ives Rep. 22. 1860. (Nomen confusum)

Gilia demissa A. Gray, Proc. Amer. Acad. 8: 263. 1870.

Navarretia demissa Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus demissus Greene, Pittonia 2: 257. 1892.

Linanthus Dactylophyllum Rydb. Fl. Rocky Mts. 698. 1917.

Erect or widely spreading annual, 3–10 cm. high; stems dichotomously branched, pilose to glabrate. Leaves 3-cleft into acicular lobes, rarely 5-cleft or entire, opposite below, alternate in inflorescence; flowers sessile to short-pedicel in a dichotomous cyme; calyx deeply cleft into lanceolate lobes, puberulent to pilose, lobes margined to tip by a hyaline membrane, rarely united below to form a short pseudotube; corolla campanulate, white with 2 dark lines beneath each lobe, 5–6 mm. long, tube very short, throat 4 times the tube, lobes subequaling tube and throat; stamens inserted at base of throat, about two-thirds as long as throat, included, filaments glabrous, one longer than others; stigma exceeding stamens; capsule ellipsoid, locules several-seeded.

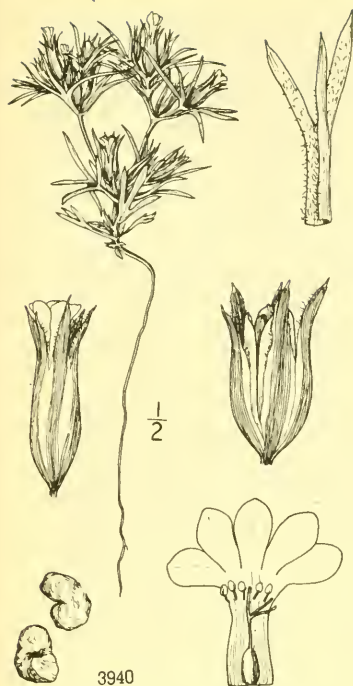
Sonoran Zones; Mojave Desert north to Inyo County, California, east to Utah and Arizona. Type locality: "S.E. California and adjacent part of Arizona." Feb.–May.

21. *Linanthus Killipii* H. L. Mason. Killip's *Linanthus*. Fig. 3946.

Linanthus concinnus of Jepson, Fl. Calif. 3: 202, in part. 1943.

Linanthus Killipii H. L. Mason, Madroño 9: 250. 1948.

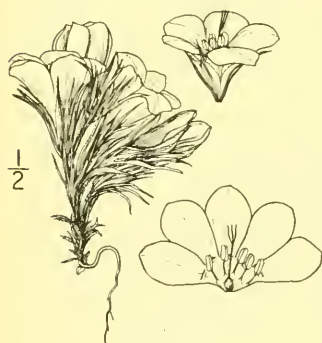
Erect annual, branching usually well above the base, basal internodes often congested, the upper wiry, 1–8 times the leaves, puberulent to somewhat floccose at nodes; cotyledons sessile, ovate, narrowly perfoliate. Leaves palmately cleft into 5–7 linear lobes, 3–10 mm. long, puberulent to glabrate below, hairy above with weak white hairs, the lower somewhat narrowly perfoliate at base; flowers sessile in 3–7 flowered, congested cymules; calyx deeply cleft into linear lobes, sparsely pilose below, sinuses over half-filled with a broad hyaline membrane which flanks



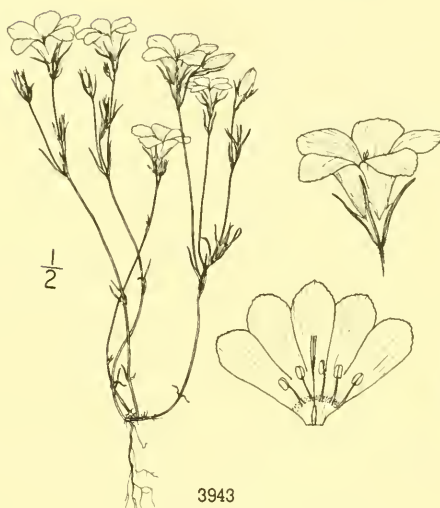
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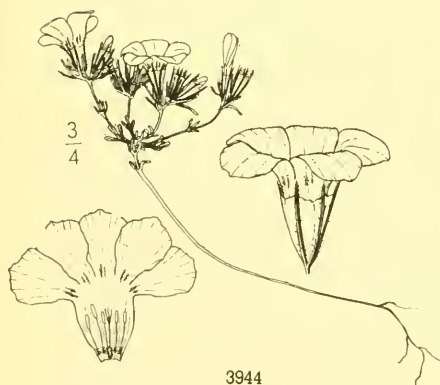
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3940. *Linanthus arenicola*
3941. *Linanthus parryae*
3942. *Linanthus bellus*

3943. *Linanthus dianthiflorus*
3944. *Linanthus concinnus*

3945. *Linanthus demissum*
3946. *Linanthus killipii*

the lobes above, thus forming an evident pseudotube, which expands with the growing capsule; corolla 10–15 mm. long, narrowly funnelform, tube 4–5 mm. long, stout, from subequal to slightly longer than throat, included or barely exerted from calyx, throat narrow, lobes somewhat rhombic-obovate, denticulate or entire at apex, with a linear spot near the base; stamens inserted on throat near junction with tube, filaments glabrous, equaling throat, anthers disposed in orifice of throat; stigma slightly exceeding anthers, its lobes about 1 mm. long; capsule-locules several-seeded, valves adhering at base; seeds ellipsoid, reddish brown, unaffected by wetting.

Upper desert slopes, Upper Sonoran and Arid Transition Zones; San Bernardino Mountains, Cactus Flat to Baldwin Lake, California. Type locality: Cactus Flat. June–July.

22. *Linanthus Orcuttii* subsp. *pacificus* (Milliken) H. L. Mason. Orcutt's *Linanthus*. Fig. 3947.

Linanthus pacificus Milliken, Univ. Calif. Pub. Bot. 2: 53. 1904.

Gilia pacifica Brand, Pflanzenreich 4²⁵⁰: 134. 1907.

Linanthus Orcuttii of Jepson, Man. Fl. Pl. Calif. 804. 1925. Not Parry & Gray.

Erect or diffuse annual, 5–15 cm. high, stems few to several, branching from base, puberulent. Leaves 3–7-parted into linear divisions, 5–12 mm. long, sparsely pilose to ciliate or glabrate; flowers in few-flowered cymes; calyx deeply cleft into linear divisions 6–10 mm. long, membrane margined, the membrane united below forming a short pseudotube; corolla funnelform, 15–30 mm. long, pink to blue, tube stout, 5–20 mm. long, 1.5–2 times the calyx, throat yellow, 2–4 mm. long, lobes 5–8 mm. long, each with a reniform purple spot at the base; stamens inserted on the base of and equaling the throat, anthers disposed in the orifice of throat; stigma exerted; capsule cylindric, 5–8 mm. long, locules 6–12-seeded.

Open ground in chaparral, Upper Sonoran Zone; Palomar Mountain, San Diego County, California. Type locality: "Cootca, Palomar, Riverside Co." May–June.

23. *Linanthus grandiflorus* (Benth.) Greene. Large-flowered *Linanthus*. Fig. 3948.

Leptosiphon grandiflorus Benth. Bot. Reg. 19: under pl. 1622. 1833.

Leptosiphon densiflorus Benth. loc. cit.

Gilia Leptosiphon Steudel, Nom. ed. 2. 1: 684. 1840.

Gilia grandiflora Steudel, op. cit. 683.

Navarretia densiflora Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus grandiflorus Greene, Pittonia 2: 260. 1892.

Linanthus densiflorus Jepson, Fl. W. Mid. Calif. 431. 1901.

Erect annual, 1–5 dm. high, stems stout, simple or branched below summit, puberulent to glabrate or sometimes glandular-villous below nodes. Leaves 5–11-cleft into linear lobes 1–3 cm. long; flowers congested into 1 or more densely bracteate heads, rarely in 1 or 2 whorls; calyx deeply cleft into linear segments, densely silky-pilose with white hairs, sinuses two-thirds filled with broad hyaline membrane which is truncate across top and forms a conspicuous pseudotube; corolla stout-funnelform, 15–30 mm. long, white to pale lilac, tube 1–2 times the calyx, a hairy ring within; stamens inserted about midway on throat, anthers disposed in orifice of throat, filaments glabrous; stigma barely exerted; capsule ellipsoid, locules 1–5-seeded.

Coastal dunes and open woods, Arid Transition and Upper Sonoran Zones; Sonoma County to Santa Barbara County, east to western Merced County, California. Type locality: "California," probably Monterey. Collected by Douglas. April–July.

24. *Linanthus breviculus* (A. Gray) Greene. Mojave *Linanthus*. Fig. 3949.

Gilia brevicula A. Gray, Proc. Amer. Acad. 12: 79. 1876.

Navarretia brevicula Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus breviculus Greene, Pittonia 2: 259. 1892.

Linanthus androsaceus var. *breviculus* Milliken, Univ. Calif. Pub. Bot. 2: 57. 1904.

Erect annual, 6–30 cm. high, stems slender, cymosely branched, puberulent or glabrate. Leaves 3–5-parted into linear lobes 3–10 mm. long, margins often setose-hispid; flowers sessile in small bracteate glomerules or heads at the ends of the branches or in the upper axils; calyx deeply cleft into linear lobes, villous-hirsute to pilose, sinuses over half-filled with a hyaline membrane forming an evident pseudotube; corolla salverform, 15–20 mm. long, white (pink or lilac or purple in subspecies), tube glabrous, slender, about twice the calyx, throat ample, lobes obovate; stamens inserted on throat, 2 mm. long, anthers disposed in orifice, filaments glabrous, about 2 times the anthers; stigma exerted, lobes longer than stamens; capsule-locules several-seeded.

Deserts and desert mountains, Upper and Lower Sonoran Zones; from the Tehachapi Range through the western half of the Mojave Desert to the San Bernardino Mountains, California. Type locality: "On the Mohave River, S.E. California." May–Aug.

Linanthus breviculus subsp. *Royalis* (Brand) H. L. Mason. (*Gilia Royalis* Brand, Ann. Conserv. & Jard. Bot. Genève 15–16: 336. 1913.) Similar to the species but with corolla 20–35 mm. long, sometimes with a narrower limb and often the tube a deep royal purple. Upper desert slopes of the San Gabriel and San Bernardino Mountains, California, at about 6,000 feet. Type locality: Swartout Canyon, San Gabriel Mountains, California.

25. *Linanthus nudatus* Greene. Tehachapi *Linanthus*. Fig. 3950.

Linanthus nudatus Greene, *Erythea* 3: 120. 1895.

Gilia nudata Brand, *Pflanzenreich* 4²⁵⁰: 138. 1907.

Linanthus breviculus var. *nudatus* H. L. Mason in Jepson, *Man. Fl. Pl. Calif.* 806. 1925.

Linanthus Nashianus Jepson, *Fl. Calif.* 3: 217. 1943.

Erect annual, 5–25 cm. high, stems simple or with few divergent branches from above or occasionally several branches from base, internodes short below, those above 3–8 cm. long, those of the branches sometimes up to 12 cm. long. Leaves 5–11-cleft into linear hispidulous ciliate segments 3–12 mm. long; flowers sessile in compact bracteate heads, bracts densely hirsute-ciliate, palmately cleft into 3–9 linear divisions each jointed on the lower half by a conspicuous hyaline membrane; calyx deeply cleft into linear densely villous ciliate lobes, sinuses over half-filled with a pilose hyaline membrane; corolla salverform, the slender pubescent tube about 2 times the calyx, lobes white to lilac, throat yellow, tube dark, throat ample; stamens inserted on lower half of throat, exserted, filaments glabrous, unequal to subequal; stigma long-exserted, lobes 2–3 mm. long; capsule-locules 1-seeded, seeds rugose.

Upper Sonoran and Arid Transition Zones; southern Sierra Nevada through the Greenhorn and eastern Tehachapi Mountains, California. Type locality: "Probably common in Lake County" (apparently an error). May–July.

26. *Linanthus tularensis* (Brand) H. L. Mason. Tulare *Linanthus*. Fig. 3951.

Gilia tularensis Brand, *Pflanzenreich* 4²⁵⁰: 136. 1907.

Linanthus tularensis H. L. Mason, *Madroño* 9: 253. 1948.

Erect annual 1–15 cm. high, stems slender, cymosely branched, puberulent. Leaves 3–5-cleft into linear oblanceolate lobes 6–15 mm. long; cotyledons sessile, somewhat connate at base; flowers sessile in bracteate heads at ends of branches and a few sessile in upper axils; calyx deeply cleft into linear hispidulous lobes, sinuses over half-filled with a broad hyaline membrane effecting a narrowly campanulate pseudotube which may be distended but not ruptured by the growing capsule; corolla salverform, 8–12 mm. long, white with yellow throat, tube very slender, 2–2.5 times the calyx, throat ample, lobes oblong, truncate or emarginate; stamens inserted midway on throat, 2–4 mm. long, equal to slightly unequal, anthers long-exserted from orifice of throat, filaments glabrous; stigma exserted; capsule ellipsoid, seeds solitary in the locules.

Borders of meadows, Boreal Zones; southern Sierra Nevada in the basin of the upper Kern River, California. Type locality: "Smith meadow, Fish Creek, Tulare County, 2,800 m." July–Aug.

Linanthus tularensis subsp. *Culbertsonii* (Brand) H. L. Mason. (*Gilia oblanceolata* Brand, *Pflanzenreich* 4²⁵⁰: 136. 1907; *G. oblanceolata* var. *Culbertsonii* Brand, *op. cit.* 137; *Linanthus oblanceolatus* Eastw. ex C. F. Baker, *West Amer. Pl.* 3: 8. 1904, as *nomen nudum*.) Similar to species but smaller, stems simple or spreading, inflorescence glandular-puberulent to lanate, corolla pubescent on exterior of throat. Hudsonian Zone, 9,000–10,000 feet, southern Sierra Nevada, California. Type locality: Hockett Meadow, Tulare County.

27. *Linanthus ciliatus* (Benth.) Greene. Whisker-brush or Bristly-leaved *Linanthus*. Fig. 3952.

Gilia ciliata Benth. *Pl. Hartw.* 325. 1849.

Navarretia ciliata Kuntze, *Rev. Gen. Pl.* 2: 433. 1891.

Linanthus ciliatus Greene, *Pittonia* 2: 260. 1892.

Linanthus neglectus Greene, *Erythea* 3: 24. 1895.

Leptosiphon ciliatus Jepson, *School Fl.* 77. 1902.

Gilia ciliatus var. *neglectus* Brand, *Pflanzenreich* 4²⁵⁰: 137. 1907.

Linanthus ciliatus var. *neglectus* Jepson, *Man. Fl. Pl. Calif.* 806. 1925.

Erect or occasionally spreading slender annual, stems 1–3 dm. high, simple or branched from the base, herbage puberulent to hispid-ciliate. Leaves 5–11-cleft into linear coarsely hispid, ciliate lobes; flowers sessile in leafy bracteate heads; bracts densely hispid-ciliate; calyx deeply cleft into acerose hispid-ciliate lobes, sinuses about half-filled with a broad conspicuous hyaline membrane forming a very evident pseudotube; corolla salverform, 12–25 mm. long, pink to rose or white, except for yellow throat which occasionally bears a dark spot below the lobes, lobes obovate, sometimes truncate, 2–4 mm. long; stamens inserted about midway on throat, exserted from its orifice, filaments glabrous; stigma disposed in orifice of throat, lobes about 1 mm. long; capsule-locules few-seeded.

Upper Sonoran Zone to Boreal Zone; southern Oregon through the California Coast Ranges and Sierra Nevada to southern California, each to Nevada. Type locality: sandy places in the Sacramento Valley. The form described as *Linanthus neglectus* Greene, of doubtful varietal status, is found throughout the range of the species, April–July.

28. *Linanthus montanus* Greene. Mustang Clover. Fig. 3953.

Linanthus ciliatus var. *montanus* Greene, *Pittonia* 2: 260. 1889.

Linanthus montanus Greene, *Erythea* 3: 120. 1895.

Gilia androsacca subsp. *montana* Brand, *Pflanzenreich* 4²⁵⁰: 141. 1907.

Gilia montana Parish, *Plant World* 20: 250. 1917.

Gilia ciliata var. *montana* Munz, *Man. S. Calif.* 398. 1935.

Erect annual, 1–6 dm. high, stems stout, simple or with a few branches from the base, puberulent. Leaves 5–11-cleft into linear ciliate lobes 2–3 cm. long; flowers sessile in densely bracteate heads, bracts palmately cleft into linear coarsely white-ciliate lobes; calyx deeply cleft into linear coarsely villous-ciliate segments, sinuses about half-filled with a hyaline membrane; corolla funnellform to salverform, long-exserted from calyx, 25–30 mm. long, lilac-pink



3947



3948



3950



3949



3951

3951. *Linanthus tularensis*

3947. *Linanthus Orcuttii*
 3948. *Linanthus grandiflorus*

3949. *Linanthus breviculus*
 3950. *Linanthus nudatus*

or white with a purple spot at the base of each lobe, tube puberulent, glandular, throat narrow to ample, lobes 5–8 mm. long, nearly as wide; stamens inserted about half-way on throat, anthers disposed in orifice of throat, filaments glabrous; stigma not exceeding anthers; capsule-locules few-seeded.

Upper Sonoran and lower Transition Zones; foothills of the west side of the Sierra Nevada from Nevada County to the Greenhorn Mountains of Kern County, reaching the valley floor between Merced and Modesto, California; (Bear Valley, San Bernardino Mountains, according to Munz). Type locality: "Sierra Nevada at higher than middle elevations." May–Aug.

29. *Linanthus serrulatus* Greene. Madera *Linanthus*. Fig. 3954.

Linanthus serrulatus Greene, *Erythea* 3: 120. 1895.

Linanthus mariposanus Milliken, Univ. Calif. Pub. Bot. 2: 57. 1904.

Leptosiphon mariposanus Heller, *Muhlenbergia* 2: 231. 1906.

Gilia mariposana Brand, *Pflanzenreich* 4²⁵⁰: 137. 1907.

Gilia androsacea subsp. *serrulata* Brand, op. cit. 142.

Erect annual, 5–20 cm. high, stems simple or branched above. Leaves 5–7-cleft into linear sparsely hispid segments; flowers sessile in terminal heads or a few also in the upper axils; calyx deeply cleft into linear-lanceolate lobes, sparsely hispid, sinus-membrane obsolete, or very inconspicuous in the base of the sinuses; corolla salverform, 8–15 mm. long, white, tube purple, 1.5–2 times calyx, finely pilose-puberulent, throat short, yellow, lobes oblanceolate to obovate, 5–8 mm. long, subequalling tube and throat; stamens inserted on throat, about 2 mm. long, anthers disposed in the orifice of throat, filaments glabrous; stigma barely exerted, the lobes longer than stamens; capsule-locules few-seeded.

Upper Sonoran Zone; southern Sierra Nevada foothills, Madera County to Tulare County, California. Type locality: near Madera, California. March–May.

30. *Linanthus androsaceus* (Benth.) Greene. Common *Linanthus*. Fig. 3955.

Leptosiphon androsaceus Benth. Bot. Reg. 19: under pl. 1622. 1833.

Gilia androsacea Steudel, Nom. ed. 2. 1: 683. 1840.

Gilia androsacea var. *detonsa* A. Gray, Proc. Amer. Acad. 8: 265. 1870.

Navarretia androsacea Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus androsaceus Greene, *Pittonia* 2: 258. 1892.

Gilia androsacea subsp. *eu-androsacea* Brand, *Pflanzenreich* 4²⁵⁰: 141. 1907.

Erect or rarely decumbent annuals, 6–30 cm. high; stems simple or much-branched, glabrate to hirsute or villous. Leaves 5–9-parted into linear or oblanceolate segments, often the middle segment largest, especially on the lowermost leaves, segments 1–3 cm. long, glabrate to hispid or hirsute; flowers sessile in terminal bracteate heads, bracts similar to leaves; calyx deeply cleft to the short herbaceous tube, sinuses with a narrow, short, inconspicuous membrane; corolla salverform, white, pink, yellow to lilac or rose, 2–5 times the calyx, throat ample, some-



3952. *Linanthus ciliatus*

3953. *Linanthus montanus*

3954. *Linanthus serrulatus*

times the throat and tube dark; stamens inserted about midway on throat, anthers barely exerted from orifice of throat, filaments glabrous; stigmas included or shortly exerted; styles included (except in subspecies); capsule ellipsoid, locules several-seeded, seeds beset with rugose papillae. A highly polymorphic genetic complex.

Grassy hills and open woods, North Coast Ranges of California from Monterey County to Humboldt County. Type locality: "California." Collected by Douglas. April-June.

KEY TO SUBSPECIES.

Style and usually also the stigma included.

Papillae of seed-coat with no definite pattern, rarely indistinctly annular; stigma-lobes usually included, rarely exerted.

Corolla-limb 10-15 mm. broad, tube 1-2 mm. broad.

Corolla-tube 1.5-2 times the calyx.

Stems simple or with few erect branches from base; Monterey County to Humboldt County in open woods and grassland, typical.

Stems much-branched, spreading or decumbent, sometimes erect; Monterey County south in Coast Ranges to the Tehachapi and San Gabriel Mountains.

Corolla-tube 3-4 or 5 times the calyx, limb sometimes as much as 15 mm. broad; plants spreading or decumbent; coastal bluffs and mesas from Sonoma County south to Monterey County.

Corolla-limb 6-10 mm. broad, the tube usually filiform or at least slender; Inner and Outer Coast Ranges; Lake and Mendocino Counties to Santa Barbara County.

Papillae of seed-coat in a definite corrugated annular pattern around the seed; stigma-lobes exerted or included.

Corolla always white; stems simple and erect or with 2 or 3 erect stems; Sierra Nevada foothills from Fresno County to Butte County.

Corolla usually yellow, pink, or lilac, less commonly white, stems decumbent or ascending; southern California north in the Inner South Coast Ranges and the hills bordering the southern Salinas Valley to southern Monterey County.

Style and stigma long-exserted; papillae of seed-coat forming an annular pattern; plants usually erect, simple or with several erect stems; usually on the coastal slopes of the mountains of southern California north along coast to Monterey Bay.

Linanthus androsaceus subsp. *Plaskettii* (Eastw.) H. L. Mason. (*Linanthus Plaskettii* Eastw. Bot. Gaz. 37: 443. 1904; *L. graciosus* Milliken, Univ. Calif. Pub. Bot. 2: 59. 1904; *Gilia graciosa* Brand, Pflanzenreich 4²⁵⁰: 140. 1907; *G. tassajarae* Brand (orth. emend.) loc. cit., as *G. jassajarae*.) Similar to the typical species except for its slightly smaller corollas, much-branched and spreading habit, and more southern range. Type locality: "Santa Lucia Mts."

Linanthus androsaceus subsp. *crœceus* (Milliken) H. L. Mason. (*Gilia longituba* Benth. Pl. Hartw. 324. 1849; *Leptosiphon parviflorus* var. *rosaceus* Hook. Bot. Mag. 96: pl. 5863. 1870; *Gilia lutea* var. *rosea* Regel, Gartenfl. 20: 97. pl. 682. 1871; *Leptosiphon roseus* Thompson, Gard. Chron. 1264. 1871; *Gilia androsacea* var. *rosacea* A. Gray, Bot. Calif. 1: 491. 1880; *Linanthus rosaceus* Greene, Pittonia 2: 259. 1892; *L. parviflorus* var. *rosaceus* Jepson, Fl. W. Mid. Calif. 431. 1901; *L. parviflorus* var. *crœceus* Milliken, Univ. Calif. Pub. Bot. 2: 59. May, 1904; *L. crœceus* Eastw. Bot. Gaz. 37: 449. June, 1904; *L. longituba* Heller, Muhlenbergia 1: 43. 1904; *Gilia longituba* subsp. *eu-longituba* Brand, Pflanzenreich 4²⁵⁰: 140. 1907; *G. longituba* var. *rosacea* Brand, loc. cit.; *G. longituba* subsp. *crœcea* Brand, op. cit. 141.) Type locality: "Monterey."

Linanthus androsaceus subsp. *luteus* (Benth.) H. L. Mason. (*Leptosiphon luteus* Benth. Bot. Reg. 19: under pl. 1622. 1833; *Gilia lutea* Steudel, Nom. ed. 2: 1: 684. 1840; *G. micrantha* var. *aurea* Benth. Pl. Hartw. 325. 1849; *G. lutea* subsp. *eu-lutea* Brand, Pflanzenreich 4²⁵⁰: 142. 1907; *G. lutea* var. *aurea* Brand, op. cit. 143; *Linanthus parviflorus* of Jepson, Man. Fl. Pl. Calif. 805, in part. 1925; Fl. Calif. 213. 1943.) Type locality: "California." Collected by Douglas.

Linanthus androsaceus subsp. *laëtus* H. L. Mason, Madroño 9: 249. 1948. Type locality: Cherokee, Butte County.

Linanthus androsaceus subsp. *luteolus* (Greene) H. L. Mason. *Linanthus luteolus* Greene, Erythea 3: 121. 1895; *L. parviflorus* var. *luteolus* Milliken, Univ. Calif. Pub. Bot. 2: 58. 1904; *Gilia lutea* subsp. *luteola* Brand, Pflanzenreich 4²⁵⁰: 143. 1907.) Type locality: Cuyamaca Mountains, San Diego County.

Linanthus androsaceus subsp. *micranthus* (Steudel) H. L. Mason. (*Leptosiphon parviflorus* Benth. Bot. Reg. 19: under pl. 1622. 1833; *Gilia micrantha* Steudel ex Benth. A. DC. Prod. 9: 315. 1845; *Linanthus parviflorus* Greene, Pittonia 2: 258. 1892; *Gilia lutea* subsp. *micrantha* Brand, Pflanzenreich 4²⁵⁰: 142. 1907; *G. lutea* var. *longistylus* Munz, Man. S. Calif. 398. 1935.) Type locality: "California." Collected by Douglas.

31. *Linanthus bicolor* (Nutt.) Greene. Bicolored *Linanthus*. Fig. 3956.

Leptosiphon bicolor Nutt. Journ. Acad. Phila. II. 1: 156. 1848.

Gilia tenella Benth. Pl. Hartw. 325. 1849. Not *G. tenella* A. Gray or Nutt.

Navarretia tenella Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus bicolor Greene, Pittonia 2: 260. 1892.

Linanthus Eastwoodiae Heller, Muhlenbergia 1: 125. 1905.

Gilia bicolor Piper, Contr. U.S. Nat. Herb. 11: 460. 1906.

Linanthus diffusa Heller ex Brand, Pflanzenreich 4²⁵⁰: 139, as a synonym. 1907.

Erect or spreading annual, 5-16 cm. high, simple or branched, herbage puberulent to hispid. Leaves 3-7-cleft into linear segments or the middle segment broader, then from orbicular to linear; flowers sessile in densely bracteate heads, rarely more than one or two blooming at a time in each head; calyx deeply cleft to the very short tube, hispid, the sinuses usually with a very small inconspicuous membrane, rarely naked; corolla salverform, 15-30 mm. long, always bicolored, the lobes from red to pink or white, throat yellow, tube 2-4 times the calyx, stout, throat ample, 1-3 mm. long; stamens inserted in the throat, exerted from the orifice; stigma 0.5-1.5 mm. long; capsule-locules few-seeded.

Vancouver Island, British Columbia, south through the Cascade Mountains of Oregon and Washington to the Coast Ranges and Sierra Nevada foothills, California, coastal and insular southern California. Type locality: "on the Oregon near the outlet of the Wahlamet." April-June.

Linanthus bicolor subsp. *minimus* H. L. Mason, Madroño 9: 250. 1948. Corolla minute, about 1 cm. long, white to sordid. Coastal area from Bodega Head, California, north to Puget Sound, Washington. Type locality: Gages Point, Skagit County, Washington.

32. *Linanthus aciculàris* Greene. Bristly *Linanthus*. Fig. 3957.

?*Gilia micrantha* var. *aurea* Benth. Pl. Hartw. 325. 1849.

Linanthus acicularis Greene, Pittonia 2: 259. 1892.

Leptosiphon acicularis Jepson, School Fl. 77. 1902.

Gilia lutea subsp. *micrantha* var. *acicularis* Brand, Pflanzenreich 4²⁵⁰: 142. 1907.

Erect or spreading annual, 5–15 cm. high, stems simple or branched from below, puberulent. Leaves 3–7-parted into linear hispid ciliate lobes 4–8 mm. long; flowers sessile in densely bracteate heads; calyx deeply parted into linear attenuate hispidulous lobes, sinuses with an inconspicuous membrane at the base; corolla salverform, 1–2 cm. long, golden-yellow, tube very slender-filiform, 2–3 times calyx, throat very short, ample, lobes 3–4 mm. long; stamens inserted on throat, anthers exerted from orifice, filaments glabrous; stigma exerted, lobes 2–4 mm. long; capsule cylindric, locules 3–4-seeded.

North Coast Ranges usually between the Inner and the Outer from eastern Humboldt County to Alameda County, California. Type locality: not indicated. April–June.

33. *Linanthus Nuttallii* Greene. Nuttall's *Linanthus*. Fig. 3958.

Gilia Nuttallii A. Gray, Proc. Amer. Acad. 8: 267. 1870.

Siphonella parviflora Nutt. ex A. Gray, loc. cit., as a synonym.

Siphonella montana Nutt. ex A. Gray, loc. cit., as a synonym.

Navarretia Nuttallii Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus Nuttallii Greene ex Milliken, Univ. Calif. Pub. Bot. 2: 54. 1904.

Leptodactylon Nuttallii Rydb. Bull. Torrey Club 33: 149. 1906.

Gilia Nuttallii var. *montana* Brand, Pflanzenreich 4²⁵⁰: 125. 1907.

Gilia Nuttallii var. *parviflora* Brand, loc. cit.

Siphonella Nuttallii Heller, Muhlenbergia 8: 57. 1912.

Linanthastrum Nuttallii Ewan, Journ. Wash. Acad. 32: 139. 1942.

Erect perennial, stems thickly branched from a persistent woody base, usually winter-killed back to the base each year, herbage villous-hispid to glabrate. Leaves 5–9-cleft into relatively short stout linear-lanceolate or linear-oblong lobes, each usually with a fascicle of smaller leaves in its axil; flowers sessile or subsessile, usually capitately congested or a few also in the upper axils; calyx cleft to the short herbaceous proper tube, sinuses usually with or sometimes without a narrow membrane; corolla salverform to funnelform, 12–15 mm. long, white to cream-yellow, tube equaling the calyx, throat ample but short, lobes oblanceolate, sometimes narrowed to a slender claw; stamens inserted on the base of the throat, barely exerted, filaments glabrous; stigma included or disposed in the orifice of the throat; capsule oblong, seeds 1–4 in each locule.

Dry gravelly or sandy slopes or benches, Arid Transition and Canadian Zones; North Coast Ranges in the vicinity of the Klamath gap, Sierra Nevada, California, chiefly on the east side, to eastern Oregon and Washington; San Bernardino Mountains, California, east to the Rocky Mountains. Type locality: "Rocky Mountains of Colorado and Utah to the Sierra Nevada in California." "R. Mts. Bear hills" label on Nuttall's specimen. May–Aug.

34. *Linanthus floribundus* (A. Gray) Greene. Many-flowered *Linanthus*. Fig. 3959.

Gilia floribunda A. Gray, Proc. Amer. Acad. 8: 267. 1870.

Navarretia floribunda Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Linanthus floribundus Greene ex Milliken, Univ. Calif. Pub. Bot. 2: 55. 1904.

Gilia Nuttallii subvar. *floribunda* Brand, Pflanzenreich 4²⁵⁰: 125. 1907.

Linanthus saxiphilus Davidson, Bull. S. Calif. Acad. 19: 10. 1920.

Leptodactylon Nuttallii var. *floribundum* Jepson, Man. Fl. Pl. Calif. 808. 1925.

Leptodactylon floribundum Tidestrom, Proc. Biol. Soc. Wash. 48: 42. 1935.

Gilia Nuttallii var. *floribunda* Munz, Man. S. Calif. 399. 1935.

Linanthus Nuttallii var. *floribundus* McMinn, Ill. Man. Calif. Shrubs 446. 1939.

Linanthastrum Nuttallii subsp. *floribundum* Ewan, Journ. Wash. Acad. 32: 141. 1942.

Siphonella floribunda Jepson, Fl. Calif. 3: 219. 1943.

Erect perennial, stems slender, 1–4 dm. high, branching from an indurated woody base. Leaves 3–5-cleft into linear filiform segments or entire, each with a fascicle of smaller leaves in its axil; flowers subsessile or long-pediceled in terminal or axial cymules, sometimes the lowermost in pairs; calyx cleft to the short herbaceous tube, sinuses with or without a narrow membrane; corolla salverform to funnelform, 8–15 mm. long, white to cream-yellow, tube equal to shortly exceeding the calyx lobes oblanceolate or spatulate; stamens inserted low on throat, barely exerted from its orifice, stigma included or barely exerted, lobes 4–5 mm. long; capsule oblong-cylindric, locules 4-seeded. Not too well differentiated from *Linanthus Nuttallii*.

Clearings on brushy slopes, in scattered localities of the mountains, Upper Sonoran and Arid Transition Zones; southern California east to Colorado, south to Chihuahua and Lower California. Type locality: "California, probably on S.E. borders, Coulter." May–Aug.

Linanthus floribundus subsp. *Hallii* (Jepson) H. L. Mason. (*Siphonella floribunda* var. *Hallii* Jepson, Fl. Calif. 3: 219. 1943.) Leaves mainly entire, the lower sometimes 3–5-cleft; flowers smaller than in the species. Known only from the type locality in Coyote Canyon, Santa Rosa Mountains, California.

6. *ERIÁSTRUM* Woot. & Standl. Contr. U.S. Nat. Herb. 16: 160. 1913.

Erect annuals or perennials, simple or virgately to paniculately or corymbosely branched. Herbage puberulent to densely arachnoid-floccose or lanate. Leaves linear and entire to pinnately toothed or dissected. Flowers sessile in bracteate heads, rarely solitary

on slender pedicels. Heads usually enveloped in a dense mat of arachnoid wool, less commonly glandular-puberulent. Calyx deeply cleft into linear, unequal to subequal simple lobes, the sinuses usually over half-filled with a hyaline membrane, lobes and membrane often densely arachnoid-woolly. Corolla blue or white to yellow, rarely pink, sometimes bicolored, funnelform to subsalverform. Stamens inserted on the base of the corolla-throat, or occasionally in or just below the sinuses of the corolla-lobes, included or exserted. Anthers versatile, often sagittate, sometimes cordate or elliptic. Capsule ellipsoid or obovoid, sometimes conspicuously 3-sided, often with the base of the style persistent on the capsule and splitting with the valves. Seeds 1 to several in each locule, usually mucilaginous when wetted. [Name Greek, meaning wool and star, in allusion to the woolly plants with star-like flowers.]

A genus of 14 species confined to western North America. Type species, *Gilia filifolia* Nutt.

Plants perennial, woody throughout, or at least from a persistent woody crown; anthers often 3-5 mm. long.

1. *E. densifolium*.

Plants annual, herbaceous throughout.

Stamens inserted in the sinuses of the petals; corolla 10-20 mm. long; anthers 2-2.5 mm. long.

2. *E. pluriflorum*.

Stamens inserted at the base of throat or at least well below sinuses.

Corolla 8-20 mm. long, the lobes equal or longer than tube; filaments 2 to 4 times throat.

Stamens subequal to equal in length; corolla-tube 1 to 1.5 times calyx; leaves usually simple and entire, lateral pinnae, if present, long and filiform.

Corolla 15-20 mm. long, its tube 4 to 6 times throat; bracts all equal or exceeding the calyx and sometimes the corolla; corolla regular; hills of Monterey Bay region.

7. *E. virgatum*.

Corolla 8-15 mm. long, the tube not over 3 times throat, tube shorter than calyx, or 1 or 2 exceeding the calyx; corolla slightly irregular; chiefly southern California.

5. *E. sapphirinum*.

Stamens very unequal in length; corolla irregular, tube 1.5 to 2 times calyx; leaves pinnately parted, pinnae rigid.

4. *E. eremicum*.

Corolla 6-12 mm. long, the lobes conspicuously shorter than tube, regular to slightly irregular.

Stems low, diffuse, divaricately branched, glabrous; stamens inserted midway on throat; corolla 6-8 mm. long; deserts.

3. *E. diffusum*.

Stems virgately, corymbosely, or racemously branched or simple; stamens inserted on base of throat.

Filaments of stamens long-exserted.

Stamens 6-8 mm. long, exceeding corolla-lobes; corolla golden yellow; seeds solitary in locules.

6. *E. luteum*.

Stamens 3-4 mm. long, not exceeding the corolla-lobes; corolla blue or white, seeds 2-4 in a locule.

8. *E. filifolium*.

Filaments included, sometimes the anthers exserted.

Corolla 9-12 mm. long; throat 2 mm. long; anthers exserted; chiefly Great Basin.

9. *E. Wilcoxii*.

Corolla 4-9 mm. long (if over 9 mm. long the anthers wholly included).

Stamens longer than throat (anther-tips exserted).

Branching racemose; corolla longer than calyx; ovules 2-4 to a locule; plants 6-30 cm. high; east base of Cascades and Sierra Nevada, Tehachapi Mountains, north to Kings River.

10. *E. sparsiflorum*.

Branching corymbose; corolla shorter than calyx; ovules solitary in locules; plants 3-10 cm. high; anthers very short; central California Coast Ranges.

14. *E. Abramsii*.

Stamens shorter than throat.

Corolla 7-10 mm. long, longer than longest sepal; ovules 1-2 in a locule.

Branching racemose, stamens 0.75 mm. long; corolla-throat 1 mm. long.

11. *E. Tracyi*.

Branching virgate-corymbose; stamens 1.5 mm. long; corolla throat 2 mm. long.

12. *E. Brandegeae*.

Corolla 4-5 mm. long, subequal to longest sepal; ovules several to each locule.

13. *E. Hooveri*.

1. *Eriastrum densifolium* (Benth.) H. L. Mason. Perennial or Many-leaved *Eriastrum*. Fig. 3960.

Huegelia densifolia Benth. Bot. Reg. 19: under *pl.* 1622. 1833.

Gilia Huegelia Steudel, Nom. ed. 2. 1: 683. 1840.

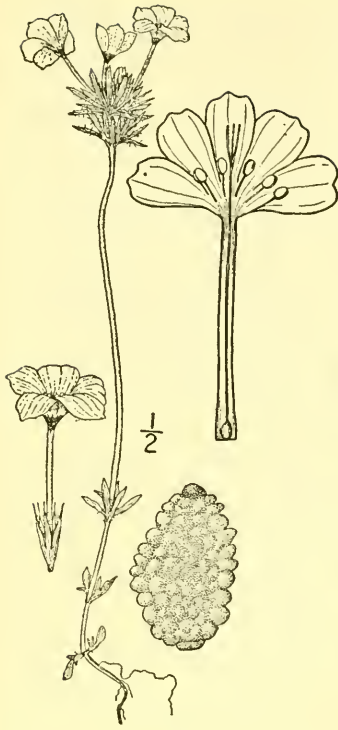
Gilia densifolia Benth. in A. DC. Prod. 9: 311. 1845.

Navarretia densifolia Kuntze, Rev. Gen. Pl. 2: 433. 1891.

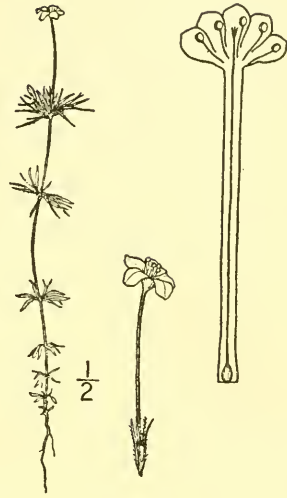
Welwitschia densifolia Tidestrom, Contr. U.S. Nat. Herb. 25: 429. 1925.

Eriastrum densifolium H. L. Mason, Madroño 8: 73. 1945.

Shrub, subshrub or woody-based perennial 2-10 dm. high, virgately branching or more commonly with numerous stems from base; stem puberulent or glabrate to lanate and densely floccose, often very leafy, sometimes much-branched in inflorescence. Leaves irregularly pinnatifid to rarely entire or pinnately few-toothed, segments usually linear, from not rigid (as in type) to almost spinose, glabrate to floccose toward base; flowers sessile in terminal, bracteate, densely arachnoid heads, several heads often aggregated to appear as one inflorescence; bracts 3-5-lobed, the middle lobe often long-attenuate with a pungent tip, lateral lobes much shorter; calyx deeply cleft into subequal lobes, each flanked almost to tip by a broad hyaline membrane which unites below to form a pseudotube a little over half the length of calyx, densely arachnoid with tangled persistent white hairs; corolla narrowly funnelform, 1.5-2 cm. long, lobes blue, tube and throat yellow or white, throat narrow, forming an angle of from 25-30 degrees, glabrous to finely puberulent within, lobes broadly elliptic to elliptic-spatulate, 8-10 mm. long; stamens



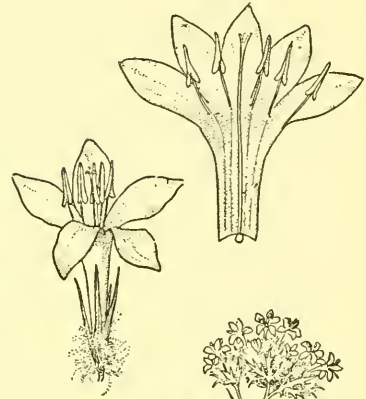
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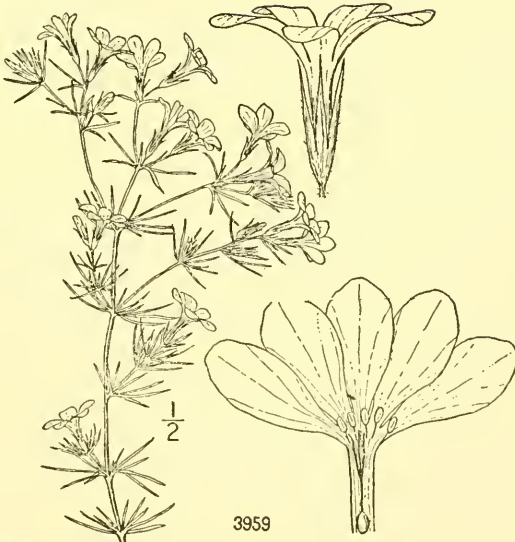
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3955. *Linanthus androsaceus*
3956. *Linanthus bicolor*

3957. *Linanthus acicularis*
3958. *Linanthus Nuttallii*

3959. *Linanthus floribundus*
3960. *Eriastrum densifolium*

inserted on throat, filaments adnate to a point just below the sinuses of the lobes, anthers sagittate, white, exserted, about half as long as corolla-lobes; style and stigma exserted; capsule ellipsoid, included, locules ridged, base of style persistent, splitting with the capsule, locules several-seeded.

Sandy mesas and chaparral-covered slopes, southern Monterey and San Benito Counties, in the Coast Ranges and Inyo County in the Sierra Nevada, California, south to Lower California. Type locality: "California." Collected by Douglas. June-Aug.

Eriastrum densifolium subsp. *elongatum* (Benth.) H. L. Mason, *Madroño* 8: 73. 1945. (*Huegelia elongata* Benth. Bot. Reg. 19: under pl. 1622. 1833; *Gilia elongata* Steudel, Nom. ed. 2. 1: 683. 1840; *Navarretia densifolia* subsp. *elongata* Brand, *Pflanzenreich* 4²⁵⁰: 165. 1907; *Gilia densifolia* var. *elongata* A. Gray ex Brand loc. cit.) Leaves more rigid, usually white-canescens; corolla 12–20 mm. long, lobes oblanceolate to narrowly spatulate; less woody than typical *Eriastrum densifolium*. Monterey and San Benito Counties and the Sierra Nevada from Inyo County south to southern California and Lower California. Type locality: "California," presumably southern Monterey County. Collected by Douglas.

Eriastrum densifolium subsp. *austromontanum* (Craig) H. L. Mason, *Madroño* 8: 74. 1945. (*Gilia densifolia* var. *austromontana* Craig, Bull. Torrey Club 61: 391. 1934; *Huegelia densifolia* subsp. *austromontana* Ewan, Bull. Torrey Club 64: 520. 1937; *Huegelia densifolia* var. *austromontana* Jepson, Fl. Calif. 3: 162. 1943.) Differs from the above in its more elaborate bracts and more complex leaf-pattern, in its lower stature, and in being less woolly. Higher mountains of southern California and northern Lower California north to Santa Barbara and Inyo Counties, California. Type locality: near Nellie, Palomar Mountains, San Diego County.

Eriastrum densifolium subsp. *mohavensis* (Craig) H. L. Mason, *Madroño* 8: 74. 1945. (*Gilia densifolia* var. *mohavensis* Craig, Bull. Torrey Club 61: 392. 1934; *Huegelia densifolia* var. *mohavensis* Jepson, Fl. Calif. 3: 162. 1943.) Leaves with a broad rachis and short spinescent teeth; bracts lanceolate-dentate. Mojave Desert, San Bernardino and Inyo Counties, California. Type locality: "sand dunes between Rosamond and Mohave, Kern Co., California."

Eriastrum densifolium subsp. *sanctorum* (Milliken) H. L. Mason, *Madroño* 8: 75. 1945. (*Gilia densifolia* var. *sanctora* Milliken, Univ. Calif. Pub. Bot. 2: 39. 1904; *Huegelia densifolia* var. *sanctora* Jepson, Man. Fl. Pl. Calif. 792. 1925.) Corolla-tube three times as long as calyx, 25–30 mm. long. Washes and bordering plains of the Santa Ana River and its tributaries. Type locality: Santa Ana River near Riverside, southern California.

2. *Eriastrum pluriflorum* (Heller) H. L. Mason. Many-flowered *Eriastrum*. Fig. 3961.

Gilia virgata var. *floribunda* A. Gray, Proc. Amer. Acad. 8: 272. 1870. Not *G. floribunda* A. Gray.

Gilia pluriflora Heller, *Muhlenbergia* 2: 113. 1906.

Navarretia virgata var. *floribunda* Brand, *Pflanzenreich* 4²⁵⁰: 168. 1907.

Gilia Brauntunii Jepson & Mason in Jepson, Fl. Econ. Pl. Calif. 130. 1924.

Huegelia Brauntunii Jepson, Man. Fl. Pl. Calif. 793. 1925.

Huegelia pluriflora Ewan, Bull. Torrey Club 64: 520. 1937.

Eriastrum pluriflorum H. L. Mason, *Madroño* 8: 75. 1945.

Erect annual, 5–40 cm. high, simple or much-branched, lightly floccose to glabrate, densely arachnoid in inflorescence. Leaves pinnately dissected into 3–11 linear-filiform lobes rarely simple and entire, 1–6 cm. long; flowers in dense heads at the ends of the numerous or less commonly few branches; calyx 7–11 mm. long, cleft into linear, unequal lobes, densely arachnoid, sinus with a membrane; corolla funnelliform, regular to somewhat irregular, 1–2 cm. long, blue, sometimes the throat and tube yellow, or wholly blue, tube puberulent; stamens inserted in sinuses, 5–6 mm. long, conspicuously exserted, anthers sagittate, white or yellow, 2–2.5 mm. long; stigma exserted; capsule 4 mm. long, 2 mm. wide; locules 2–3-seeded.

Hills bordering the San Joaquin Valley, California. Type locality: Sunset, Kern County, California. April–July.

Eriastrum pluriflorum subsp. *Sherman-Hoytiae* (Craig) H. L. Mason, *Madroño* 8: 75. 1945. (*Gilia Sherman-Hoytiae* Craig, Bull. Torrey Club 61: 415. 1934.) Short, tufted desert annual, stems 3–4 mm. long. Leaf-lobes very short, sometimes reduced to teeth; corolla-lobes over half as broad; stamens 3–4 mm. long. Centers in the western Mojave Desert, California. Type locality: 10 miles south of Muroc, California.

3. *Eriastrum diffusum* (A. Gray) H. L. Mason. Diffuse *Eriastrum*. Fig. 3962.

Gilia filifolia var. *diffusa* A. Gray, Proc. Amer. Acad. 8: 272. 1870.

Navarretia filifolia var. *diffusa* Brand, *Pflanzenreich* 4²⁵⁰: 167. 1907.

Welwitschia diffusa Rydb. Fl. Rocky Mts. 688. 1917.

Welwitschia filifolia diffusa Tidestrom, Proc. Biol. Soc. Wash. 48: 42. 1935.

Huegelia diffusa Jepson, Fl. Calif. 3: 167. 1943.

Eriastrum diffusum H. L. Mason, *Madroño* 8: 76. 1945.

Diffusely branched annual, 5–15 cm. high. Leaves simple, linear to 3–5-parted, 0.5–2 cm. long; bracts 3–7 lobed, lobes arched or slightly recurved; calyx 5–7 mm. long, lobes unequal, acerose, lower two-thirds filled with membrane; corolla subregular, 7–9 mm. long, tube 4–5 mm., throat 0.5–1.5 mm., lobes 2–2.5 mm., tube and throat white or yellow, lobes blue; stamens unequal or equal, 1–2 mm. long, inserted in middle of throat and exceeding throat, anthers cordate-sagittate, 0.5 mm. long; stigma 1 mm. long, exserted from throat; capsule 3–4 mm. long, locules 2–3-seeded.

Throughout the desert regions of the southwest from southern California and southern Nevada south to Lower California and Sonora, east to Utah, Texas, and northern Mexico. Type locality: Fort Mohave, Arizona. March–May.

Eriastrum diffusum subsp. *Jonesii* H. L. Mason, *Madroño* 8: 77. 1945. (*Gilia eremica* var. *Yageri* Craig, Bull. Torrey Club 61: 420. 1934, as to lectotype only, not *G. virgata* var. *Yageri* M. E. Jones.) Plant 3–15 cm. high, diffusely branched, floccose-lanate throughout. Leaves simple, linear, to 3–5-parted; flowers in compact heads, corolla slightly irregular, 10–12 mm. long, lobes blue, tube white or yellow; stamens 2–3 mm. long, equal or unequal, inserted about midway on throat; anthers cordate to oval, 0.7–1 mm. long. Throughout the desert area of Arizona south to Sonora. Type locality: Pima County, Arizona.

Eriastrum diffusum subsp. *Harwoodii* (Craig) H. L. Mason, *Madroño* 8: 77. 1945. (*Gilia filifolia* var. *Harwoodii* Craig, Bull. Torrey Club 61: 424. 1934; *Huegelia diffusa* var. *Harwoodii* Jepson, Fl. Calif. 3: 167. 1943.) Heads densely lanate-floccose; corolla-lobes apiculate; stamens inserted midway on the throat. Eastern Mojave Desert. Type locality: Blythe Junction, Riverside County, California.

4. *Eriastrum eremicum* (Jepson) H. L. Mason. Desert Eriastrum. Fig. 3963.

Navarretia densifolia var. *jacumbana* Brand, Ann. Conserv. & Jard. Bot. Genève 15 and 16: 340. 1913.

Huegelia eremica Jepson, Man. Fl. Pl. Calif. 793. 1925.

Gilia eremica Craig, Bull. Torrey Club 61: 416. 1934.

Gilia eremica var. *zionis* Craig, op. cit. 418.

Eriastrum eremicum H. L. Mason, Madroño 8: 78. 1945.

Erect or spreading annuals, 2–15 cm. high, divaricately branched, glabrate to sparingly floccose. Leaves pinnatifid into 3–7 lobes, or rarely entire; flowers congested into small heads at the ends of the branches; bracts recurved at tips; calyx cleft into linear, subequal divisions, membranous in sinuses; corolla from strongly bilabiate to nearly regular, corolla from 1.5–2.5 times the calyx, violet; stamens inserted at base of throat, very unequal in length, the longest exserted, anthers sagittate, white or yellow; pistil exserted; capsule 3–6 mm. long, 2 mm. wide; locules several-seeded.

Desert area from southeastern California to southern Nevada, Utah, and northern Arizona. Type locality: Calico Wash, northeast of Barstow, Mojave Desert, California. April–July.

5. *Eriastrum sapphirinum* (Eastw.) H. L. Mason. Sapphire Eriastrum. Fig. 3964.

Gilia sapphirina Eastw. Bot. Gaz. 38: 71. 1904.

Navarretia virgata var. *sapphirina* Brand, Pflanzenreich 42⁵⁰: 168. 1907.

Gilia virgata var. *sapphirina* J. F. Macbride, Contr. Gray Herb. No. 49: 58. 1917.

Huegelia virgata var. *sapphirina* Jepson, Man. Fl. Pl. Calif. 793. 1925.

Eriastrum sapphirinum H. L. Mason, Madroño 8: 79. 1945.

Erect, paniculately branching annual, 20–60 cm. high; herbage viscid, glandular to puberulent, sometimes lightly floccose in inflorescence. Leaves linear and entire, 10–30 mm. long, rarely with two lateral lobes; flowers sessile in few-flowered cymes, occasionally solitary, rarely on long slender peduncles; bracts often hyaline margined and sometimes keeled at base, usually subequal to definitely shorter than the calyx; calyx deeply cleft into linear segments 5–6 mm. long with a broad, often plaited, hyaline membrane united for half the sepals then flanking the lobes above; corolla funnelform, blue with yellow tube and throat, 10–15 mm. long, tube 1–2 times the throat; stamens inserted on base of throat; filaments 4–5 mm. long, anthers sagittate, 2–2.5 mm. long; stigma exserted; capsule 4 mm. long; locules 2 mm. wide, several-seeded.

Higher elevations of mountains of southern California south to Lower California. Type locality: San Jacinto Mountains, California. May–Sept.

Eriastrum sapphirinum subsp. *gymnocéphalum* (Brand) H. L. Mason, Madroño 8: 80. 1945. (*Navarretia virgata* subsp. *gymnocephala* Brand, Pflanzenreich 42⁵⁰: 168. 1907; *Navarretia virgata* var. *oligantha* Brand, loc. cit.) Flowers solitary and pedicelled, rarely in pairs. San Diego County, California, and northern Lower California. Type locality: "Sud- und Nieder-Californien."

Eriastrum sapphirinum subsp. *dasyanthum* (Brand) H. L. Mason, Madroño 8: 80. 1945. (*Navarretia virgata* var. *dasyantha* Brand, Pflanzenreich 42⁵⁰: 168. 1907. *Huegelia virgata* var. *dasyantha* Jepson, Man. Fl. Pl. Calif. 793. 1925; *Gilia virgata* var. *dasyantha* Craig, Bull. Torrey Club 61: 395. 1934.) Heads dense, usually 5- to many-flowered, densely enveloped in matted arachnoid wool; corolla-tube 2 times throat; lowermost bracts occasionally longer than head. Lower and moderate altitudes of southern California and Lower California and perhaps ranging into the hills bordering the San Joaquin Valley. Type locality: not known.

Eriastrum sapphirinum subsp. *ambiguum* (M. E. Jones) H. L. Mason, Madroño 8: 80. 1945. (*Gilia floccosa* var. *ambigua* M. E. Jones, Contr. West. Bot. No. 13: 2. 1910; *Gilia virgata* var. *ambigua* Craig, Bull. Torrey Club 61: 412. 1934; *Huegelia virgata* var. *ambigua* Jepson, Fl. Calif. 3: 165. 1943.) Branching open-paniculate; bracts broad and short, 3–7-lobed, often destitute of any membrane on the margins; flowers in closely compacted, numerous small heads; corolla white, pale yellow or blue, lobes longer, throat shorter, and stamens shorter than typical *Eriastrum sapphirinum*. Desert slopes of the mountains of southern California. Type locality: Victorville, San Bernardino County, California.

6. *Eriastrum luteum* (Benth.) H. L. Mason. Yellow Eriastrum. Fig. 3965.

Huegelia lutea Benth. Bot. Reg. 19: under pl. 1622. 1833. Not *G. lutea* Steudel.

Gilia lutescens Steudel, Nom. ed. 2. 1: 684. 1840.

Gilia floccosa A. Gray, Proc. Amer. Acad. 8: 272, in part. 1870.

Navarretia floccosa Kuntze, Rev. Gen. Pl. 2: 433, in part. 1891.

Navarretia lutescens Kuntze, loc. cit.

Navarretia lutea Brand, Pflanzenreich 42⁵⁰: 168. 1907.

Eriastrum luteum H. L. Mason, Madroño 8: 81. 1945.

Erect annual, 5–20 cm. high, simple or branched from base, herbage arachnoid to glabrate. Leaves simple, linear and entire, or with one or two linear lateral lobes near base; flowers congested in heads; inflorescence virgate, racemously branched; bracts pinnately cleft or sometimes by a foreshortening of the rachis appearing as though palmately cleft; heads clothed with dense felty white wool; calyx deeply cleft into subequal acerose divisions over half-filled with a hyaline membrane; corolla regular or very slightly irregular, funnelform, 8–10 mm. long, yellow, tube included or slightly exserted from calyx-tube, lobes subequal to tube; stamens inserted at base of throat; filaments 5.5 mm. long, anthers sagittate, one-fourth to one-third as long as filaments; locules 1, rarely 2-seeded.

Santa Lucia Mountains of Monterey and San Luis Obispo Counties, California. Type locality: "California." Collected by Douglas. May–June.



3961



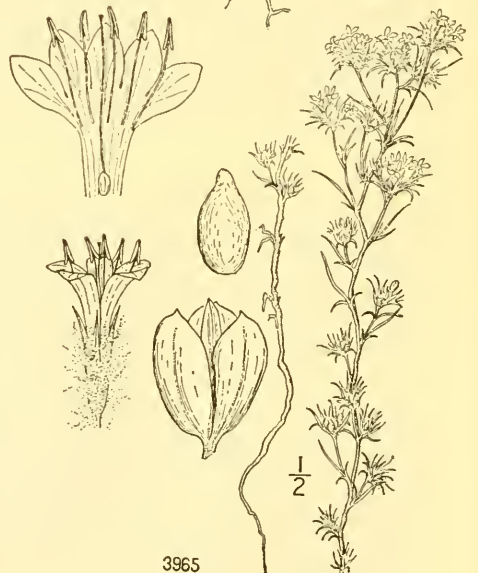
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3961. *Eriastrum pluriflorum*
3962. *Eriastrum diffusum*

3963. *Eriastrum eremicum*
3964. *Eriastrum sapphirinum*

3965. *Eriastrum luteum*

7. *Eriastrum virgatum* (Benth.) H. L. Mason. Virgate Eriastrum. Fig. 3966.

Huegelia virgata Benth. Bot. Reg. 19: under pl. 1622. 1833.

Gilia virgata Steudel, Nom. ed. 2. 1: 684. 1840.

Navarretia virgata Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Navarretia densifolia var. *lanata* Brand, Pflanzenreich 4²⁵⁰: 165. 1907.

Gilia virgata var. *typica* Craig, Bull. Torrey Club 61: 394. 1934.

Eriastrum virgatum H. L. Mason, Madroño 8: 84. 1945.

Erect, virgately branched annual, 12–40 cm. high, stems simple below, branched above, not commonly diffuse and usually virgately ascending, lightly floccose to glabrate. Leaves linear, filiform, entire or rarely with 2–4 linear-lateral lobes, 1–4 cm. long, green, sparingly floccose to glabrate; inflorescence capitate congested; bracts 3–4-cleft, lobes 15–30 mm. long; heads densely arachnoid-felty; calyx cleft into unequal linear divisions, 6–9 mm. long, sinuses about two-thirds filled with a hyaline membrane which flanks the lobes almost to the tip; corolla funnelform, 15–20 mm. long, deep vivid blue, sometimes with yellow throat and tube, tube 8–9 times the throat, throat 1–1.5 mm. long; stamens inserted at base of throat, filaments about two times the anthers, anthers sagittate; style exserted; capsule triangular, the locules oblong.

Sand hills and mesas, vicinity of Monterey Bay, from Pajaro Hills to Carmel River canyon, California. Type locality: "California." Collected by Douglas. May–July.

8. *Eriastrum filifolium* (Nutt.) Woot. & Standl. Thread-leaved Eriastrum. Fig. 3967.

Gilia filifolia Nutt. Journ. Acad. Phila. II. 1: 156. 1848.

Navarretia filifolia Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Gilia virgata var. *filifolia* Milliken, Univ. Calif. Pub. Bot. 2: 39. 1904.

Navarretia filifolia subsp. *eu-filifolia* Brand, Pflanzenreich 4²⁵⁰: 167. 1907.

Eriastrum filifolium Woot. & Standl., Contr. U.S. Nat. Herb. 16: 160. 1913.

Gilia floccosa var. *filifolia* Nels. & Machr. Bot. Gaz. 61: 35. 1916.

Welwitschia filifolia Rydb. Fl. Rocky Mts. 688. 1917.

Huegelia filifolia Jepson, Man. Fl. Pl. Calif. 792. 1925.

Gilia filifolia var. *typica* Craig, Bull. Torrey Club 61: 422. 1934.

Erect, simple and virgate, or spreading and much-branched annual, 3–40 cm. high, herbage pilose to subglabrate. Leaves 3–35 mm. long, very slender-filiform and entire to pinnately 3–5-lobed, the terminal lobe longest; heads 3–15-flowered; bracts very slender filiform; calyx 5–7 mm. long, exceeding the corolla-tube; corolla subsalverform to narrowly funnelform, regular to slightly irregular, 7–9 mm. long, blue to white, pink or yellow, tube included in calyx, throat very narrow, lobes 2–2.5 mm. long, lanceolate; stamens inserted at base of throat, conspicuously exserted, 2–3 mm. long, equal, anthers one-fourth to one-third as long as filaments, cordate-sagittate; capsule cylindric, 4–5 mm. long, 1–1.5 mm. broad, locules several-seeded, valves campanulately spreading at tips on dehiscence; seeds angular, reddish brown.

Coastal southern California and Lower California. Type locality: "Near Santa Barbara." May–July.

9. *Eriastrum Wilcoxii* (A. Nels.) H. L. Mason. Wilcox's Eriastrum. Fig. 3968.

Gilia floccosa A. Gray, emend. Syn. Fl. N. Amer. 2¹: 143. 1878. Not type of *G. floccosa* A. Gray, Proc. Amer. Acad. 8: 272. 1870.

Gilia Wilcoxii A. Nels. Bot. Gaz. 34: 27. 1902.

Welwitschia Wilcoxii Rydb. Fl. Rocky Mts. 688. 1917.

Huegelia filifolia var. *floccosa* Jepson, Fl. Calif. 3: 166. 1943, as to lectotype, not as to type.

Eriastrum Wilcoxii H. L. Mason, Madroño 8: 85. 1945.

Erect annual, 1–2 dm. high; branching from near the base, the lower branches longest, virgately corymbose or cymose; crown flat-topped or round. Leaves pinnately dissected into 5 lobes, occasionally 3 lobes, rarely simple and entire, floccose, becoming glabrate in age; bracts 3–5-lobed, the middle lobe linear-lanceolate, the lateral lobes short, divergent, and often somewhat recurved; heads 3–5-flowered, often many closely congested so as to appear as one large head at the ends of the main branches; calyx deeply cleft with unequal linear lobes, sinus-membrane over half filled by membrane which flanks the lobes to near their aristate tips; corolla funnelform to nearly salverform, 9–11 mm. long; tube 5 mm. long, throat 2 mm., both yellow or white, lobes 3.5–4 mm., blue; stamens inserted at base of throat, barely exserted, filaments equal or slightly unequal, 1.5–2.5 mm. long, anthers 1 mm. long, sagittate; pistil 6 mm. long, barely exserted; stigma 0.5 mm. long; capsule ellipsoid, locules campanulately recurved, included in calyx; seeds several to a locule, rarely solitary, angular, often margined on angles.

Eastern Washington to Idaho and Utah, south through Oregon to the Panamint Mountains of California; La Panza Range, San Luis Obispo County, California. Type locality: St. Anthony, Idaho. June–Aug.

10. *Eriastrum sparsiflorum* (Eastw.) H. L. Mason. Few-flowered Eriastrum. Fig. 3969.

Gilia sparsiflora Eastw. Proc. Calif. Acad. III. 2: 291. 1902.

Navarretia filifolia subsp. *sparsiflora* Brand, Pflanzenreich 4²⁵⁰: 167. 1907.

Gilia filifolia var. *sparsiflora* J. F. Macbride, Contr. Gray Herb. No. 49: 57. 1917.

Huegelia filifolia var. *sparsiflora* Jepson, Man. Fl. Pl. Calif. 792. 1925.

Eriastrum sparsiflorum H. L. Mason, Madroño 8: 86. 1945.

Erect annual 1–5 dm. high; branching above the base, paniculate; cotyledons elongate or

ovoid. Leaves simple or occasionally pinnately 3-lobed, rarely 5-lobed, glabrate to minutely puberulent; bracts 3-5-lobed or simple and entire, the middle lobe lanceolate, the lateral lobes much shorter, divergent or ascending, puberulent to lightly floccose; heads 1-3-flowered, solitary or 2-3 aggregated into small clusters, terminal and in the upper leaf-axils, arachnoid and lightly floccose; calyx deeply cleft into subequal lobes, 5 mm. long, sinuses over half-filled with a hyaline membrane which flanks the lobes to their tips, densely arachnoid; corolla funnelform, 6-8 mm. long, white to pale blue, tube 3-5 mm. long, throat 1 mm., lobes 2-3 mm.; stamens inserted on base of throat, exserted, filaments 1-1.5 mm. long, slightly unequal, anthers sagittate, 1 mm. long; stigma barely exserted, 0.33 mm. long; capsule ellipsoid-obovoid, 3-5 mm. long, valves campanulately spreading on dehiscence.

Dry hillsides, Upper Sonoran and Arid Transition Zones; Oregon east of the Cascades from Deschutes and Harney Counties southward through western and central Nevada, and in California along the eastern base of the Sierra Nevada to the Tehachapi Mountains, and then on the western slopes of the southern Sierra Nevada to Fresno County. Type locality: Kings River Canyon, California. June-July.

11. *Eriastrum Tracyi* H. L. Mason. Tracy's *Eriastrum*. Fig. 3970.

Eriastrum Tracyi H. L. Mason, Madroño 8: 87. 1945.

Erect slender annuals 1-2 dm. high; stems simple or racemously branched, lightly arachnoid-flocculent throughout. Lower leaves simple, upper 3-cleft above base, segments linear-filiform; flowers congested in terminal heads, often several heads aggregated at ends of branches, densely but loosely arachnoid-lanate; bracts 3-5-cleft from a broad base, often with a short membrane in the sinuses, arachnoid-lanate below, becoming glabrate above; calyx deeply cleft into unequal or subequal segments 6-8 mm. long, densely arachnoid-floccose-lanate, sinuses about half-filled with a hyaline membrane; corolla 8-9 mm. long, subsalverform, light blue to white, tube 5 mm. long, throat 1 mm. long, lobes 2-3 mm. long; stamens inserted at base of throat, about 0.75 mm. long, filaments 0.5 mm. long, anthers 0.5 mm. long, oval, versatile; pistil about one-half the corolla-tube in length; capsule 5 mm. long, 2-2.5 mm. wide, oblong-ellipsoid; seeds 1 or 2 to a locule.

Trinity County, California. Type locality: Hayfork Valley, Trinity County, California. June.

12. *Eriastrum Brandegeae* H. L. Mason. Brandegee's *Eriastrum*. Fig. 3971.

Eriastrum Brandegeae H. L. Mason, Madroño 8: 88. 1945.

Erect annual 5-30 cm. high, branching virgately, corymbose-paniculate. Leaves 3-parted into linear-filiform divisions from above the base, lightly flocculent; flowers sessile in densely arachnoid-floccose obovoid heads; bracts 3-5-lobed, exceeding the heads; heads 1 to 3 at ends of branches; calyx deeply cleft into unequal linear-acerose divisions, 7-10 mm. long, densely arachnoid, sinuses over half-filled with a narrow plaited membrane; corolla subsalverform, about 10 mm. long, white to pale blue, tube 4-5 mm. long, throat 2 mm., lobes 3 mm. long, tube and throat together shorter than calyx; stamens inserted at base of throat, 1-2 mm. long, unequal to subequal, filaments 2 times anthers, anthers cordate-sagittate, 0.5 mm. long; pistil 4-5 mm. long, included, capsule 3-sided, elliptic in outline, 4 mm. long by 2 mm. wide, shorter than the calyx; locules only rarely 2-ovuled; seed mucilaginous when wetted, solitary in locules.

Mountains of Lake County, California. Type locality: ridge southeast of Borax Lake, Lake County, California. June-Aug.

13. *Eriastrum Hooveri* (Jepson) H. L. Mason. Hoover's *Eriastrum*. Fig. 3972.

Huegelia Hooveri Jepson, Fl. Calif. 3: 167. 1943.

Eriastrum Hooveri H. L. Mason, Madroño 8: 89. 1945.

Erect annual, 10-20 cm. high, branching virgately, paniculate. Leaves linear, filiform, or 3-cleft with two long linear segments from near base, lobes tipped with a very slender point; outer bracts 3-5-lobed, the central lobe 3-4 times the flowers; calyx unequally cleft, nearly filled with a broad membrane, tips of lobes connivent over growing capsule; corolla 6 mm. long, subequal to the calyx, yellow to pale blue or white, tube 2-3 mm. long, throat 1-2 mm., lobes 2 mm., linear spatulate; stamens inserted on base of throat, equal or exceeding throat, slightly unequal to equal in length, anther versatile, ellipsoid; stigma included; capsule oblong-ellipsoid, triangular, base of style persistent; locules 3-4-seeded.

Rolling plains bordering the southern San Joaquin Valley, California. Type locality: Shafter, Kern County, California. May-July.

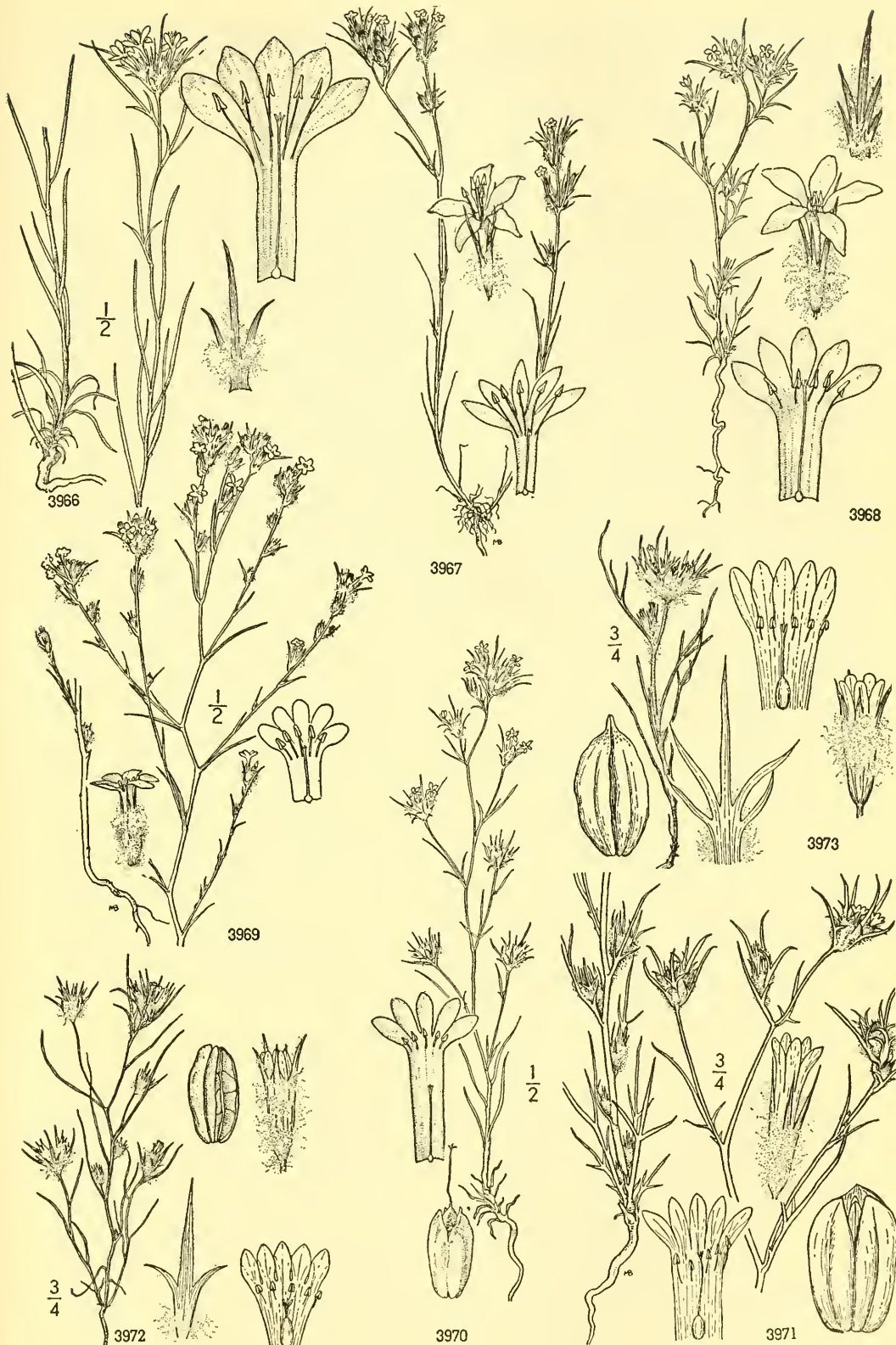
14. *Eriastrum Abramsii* (Elmer) H. L. Mason. Abrams' *Eriastrum*. Fig. 3973.

Navarretia Abramsii Elmer, Bot. Gaz. 41: 314. 1906.

Huegelia Abramsii Jepson and Bailey in Jepson, Fl. Calif. 3: 167. 1943.

Eriastrum Abramsii H. L. Mason, Madroño 8: 90. 1945.

Erect or spreading annual, 3-10 cm. tall, simple to few-branched; branching corymbose. Leaves pinnately dissected into linear filiform green segments, sparsely arachnoid below, glabrate above, 15-25 mm. long; flowers sessile in densely bracteate heads, closely packed with a white felty arachnoid pubescence which envelopes the upper branches; calyx densely cleft into linear, acicular, subequal lobes, tip and base of lobes glabrous, midpoint densely arachnoid, floccose, sinuses over half-filled with a broad hyaline membrane; corolla 6-8 mm. long, regular to slightly irregular, subequal calyx, narrowly funnelform, tube and throat yellow, lobes blue, lanceolate, rotately spreading; stamens equally inserted on throat, anthers versatile, ellipsoid to subsagittate,



3966. *Eriastrum virgatum*
 3967. *Eriastrum filifolium*
 3968. *Eriastrum Wilcoxii*

3969. *Eriastrum sparsiflorum*
 3970. *Eriastrum Tracyi*
 3971. *Eriastrum Brandegeae*

3972. *Eriastrum Hooveri*
 3973. *Eriastrum Abramsii*

filaments 2 times anthers, equal to subequal; style included; capsule triangular to ellipsoid, 4–5 mm. long, 2–2.5 mm. wide, the style-base persistent, the valves campanulately spreading at the tip on dehiscence; seeds solitary in the locules, linear with a wing-like tip at one end, developing mucilage when wet.

Mount Hamilton Range, California, east face of the Santa Cruz Mountains in Santa Clara County, California, north to Lake County and south to San Benito County, California. Type locality: Black Mountain, Santa Clara County, California. July.

7. NAVARRÈTIA Ruiz & Pavon, Fl. Peruv. Prod. 20. 1794.

Erect, spreading, or prostrate annuals, 1–30 cm. high with rigid stems, simple or divaricately branched, occasionally with several branches proliferating from beneath terminal heads; herbage often reddish-tinged, glandular-puberulent to villous, never arachnoid-floccose. Leaves alternate, entire to pinnately or palmately toothed, cleft or lobed, becoming bracteate above, acerose or spinose-tipped; lobes of leaves and bracts often proliferating, or supplemented by extra lobes arising at base or from back of rachis. Bracts usually with broadened coriaceous rachis, the inner bracts reduced. Flowers sessile to subsessile in densely bracted, spiny heads. Calyx cleft to base into unequal, entire or toothed, usually acerose lobes which are sometimes reduced to a single vein, united in sinuses in lower one-fourth to three-fourths by a scarious membrane, herein called the sinus-membrane, to form a pseudotube which is ruptured by the growing capsule. Corolla funnellform or salverform, white, yellow, blue, violet or pink, 5-merous or rarely 4-merous, 4–19 mm. long, with tube 1–10 mm. Stamens equally to unequally inserted in throat or in sinuses of corolla-lobes, included or exserted; filaments glabrous at base. Stigma entire, or 2–3-lobed, included or exserted. Capsule ovoid or obovoid, 1–3-celled, 3–8-valved, with regular or irregular dehiscence, usually breaking away circumscissilely about the base and thence splitting into valves from the base upward, or, less commonly, breaking irregularly when wetted, splitting from the tip in only 1 species. Seeds brown, minutely pitted, ovoid, or irregularly angled, 1 to many in each cell. [Named in honor of Fr. Ferdinand Navarrete, a Spanish physician.]

A genus of 30 species of which 29 occur in western North America from southern British Columbia to Lower California, east to North Dakota and New Mexico; and 1 in Chile and Argentina. Type species, *Navarretia involucrata* Ruiz & Pavon.

Capsule at length thin-membranous, the walls disintegrating on dehiscence, not splitting into discrete valves but sometimes irregularly circumscissile. (See also *N. peninsularis*.)

Lobes of the foliaceous bracts soft-herbaceous when fresh, only those within the heads stiff and acerose; rachis of bracts little expanded at base but often membranous-edged; membrane in the sinuses of the calyx-lobes truncate across top and densely ciliate, giving the appearance of a ring of hairs within the calyx.

Stamens inserted about midway on the corolla-throat; corolla white or cream-colored; plants erect, caespitose or decumbent.

Bracts highly dissected, usually some lobes proliferating from the back; corolla 7–10 mm. long; plants erect or corymbosely spreading, rarely becoming prostrate. 1. *N. leucocephala*.

Bracts pinnately lobed, the lobes all marginal or submarginal, terminal lobe often greatly exceeding lateral lobes; corolla 4–6 mm. long; plants caespitose or decumbently spreading. 2. *N. minima*.

Stamens inserted in or immediately below the sinuses of the corolla-lobes; corolla blue to purple or white; plants prostrate or decumbent, rarely erect.

Bracts within the heads pinnately lobed or dissected, occasionally with only a few short lobes proliferating from the base; foliaceous bracts 1–2 times the head; corolla 5–6 mm. long.

Stems 0.2–0.6 mm. in diameter; heads 2–15-flowered; spongy cortex of the hypocotyl 2–4 times as thick as the vascular cylinder. 3. *N. pauciflora*.

Stems 0.9–1.5 mm. in diameter; heads 20–50-flowered; spongy cortex of the hypocotyl equal to or thinner than vascular cylinder.

Plant with prostrate habit; flowers blue. 4. *N. plicantha*.

Plant not prostrate, but erect or spreading; flowers white. 5. *N. Bakeri*.

Bracts within the heads pinnately toothed, rarely somewhat lobed; foliaceous bracts 2–5 times the head; branches prostrate, proliferating radiately from below the terminal, usually acaulescent head; corolla 7–10 mm. long. 6. *N. prostrata*.

Lobes of the bracts subtending the inflorescence rigidly acerose; rachis of bracts usually coriaceous, expanded, often broadly oblong or ovate, scutelliform at base; membrane in the sinuses of the calyx-lobes not truncate; if a ring of hairs in the calyx, these on the calyx-lobes also.

Stigma 2-cleft; calyx-lobes with a tuft of hairs within at the junction with the sinus-membrane.

Bracts 7–20 mm. long, coarsely shaggy white-pilose; corolla exceeding the calyx; west of the Cascades and the Sierra Nevada. 7. *N. intertexta*.

Bracts 5–10 mm. long, pilose; corolla subequaling the calyx; east of the crest of the Cascades and the Sierra Nevada. 8. *N. propinqua*.

Stigma 3-cleft; calyx-lobes hairy or glabrous within.

Anthers on long filaments, exserted from the throat; corolla 10–12 mm. long; calyx not hairy within, lobes toothed or lobed, densely pilose. 9. *N. tagetina*.

Anthers included, each on a short filament; corolla about 5 mm. long; calyx-lobes simple, puberulent, with a tuft of hairs at the junction with the narrow membrane. 10. *N. subuligera*.

Capsule walls thicker, regularly dehiscent from the base upward, except *N. peninsularis*.

Capsule 1-celled, rarely incompletely 2-celled; stigma 2-lobed.

Corolla typically 4-merous, yellow; stamens inserted in the sinuses of the petals.

Corolla 5-merous, stamens inserted on the throat of corolla.

Stamens inserted on upper half of throat; capsule 1–8-seeded. 11. *N. cotulaefolia*.

Plant coarsely pubescent in inflorescence, not white-villous throughout; corolla yellow with a dark purple spot at base of each petal; capsule 4-8-seeded; stamens equal.

12. *N. nigellaeformis*.

Plant soft white-villous or canescent throughout; corolla purple, blue, white, or yellow, with or without spots or streaks of purple; capsule 1-seeded; stamens unequal to subequal.

Corolla 8-12 mm. long, cream-yellow and often spotted or marked with purple; stamens 1-3 mm. long, equally inserted on the throat.

13. *N. erioccephala*.

Corolla 6-7 mm. long, white or blue; stamens 0.5-1 mm. long, unequally inserted on the throat.

14. *N. heterandra*.

Stamens inserted on lower half of throat; capsule 1- rarely 2-seeded.

Capsule papery, faintly 8-nerved, dehiscent into about 8 valves; leaf-rachis linear throughout, terminal lobe acerose-toothed.

15. *N. Jepsonii*.

Capsule coriaceous, plainly 4-nerved, dehiscent into 4 valves; leaf expanding above middle into broad blade, often with deep lobes.

Capsule circumscissile about the middle, the upper part dehiscent into 4 valves; rachis of bract often ovate, coriaceous below, and expanding above a constriction into an elliptic, blade-like tip.

16. *N. scitoba*.

Capsule circumscissile about the base.

Leaf-rachis above middle broad and marginally toothed, lower lobes short, 2-forked; capsule 4-angled due to thickening along nerves.

17. *N. mitracarpa*.

Leaf with linear rachis, deeply lobed above middle; at least 1 pair of long and bipinnate lobes below; capsule not prominently 4-angled.

18. *N. pubescens*.

Capsule 2-3-celled; stigma 2-3-lobed or entire.

Leaves slender with filiform rachis, entire or pinnate, with 1-7 pairs of narrowly linear lobes near base, much-exceeded by elongate terminal segment, becoming bracteate and palmate just beneath the inflorescence; branches slender to filiform, mostly naked; plant not markedly glandular, at most only glandular-puberulent.

Capsule 3-celled with 3 valves, dehiscent from the base upward; bracts subglabrous, glandular-puberulent or villous.

Branches typically proliferating from beneath terminal heads; bracts palmate.

Corolla 10 mm. long, exceeding calyx; longest stamens just exserted; bracts densely coarse-villous dorsally.

19. *N. prolifera*.

Corolla 3.5-7.5 mm. long, shorter than calyx; stamens included; bracts subglabrous dorsally, but ciliate in sinuses of lobes.

20. *N. divaricata*.

Branches not typically proliferating from beneath terminal heads; bracts pinnate.

Herbage sparsely arachnoid; lobes of leaves and bracts about 0.5 mm. broad; stamens subequally inserted in throat, included.

21. *N. peninsularis*.

Herbage glandular-puberulent; lobes of leaves and bracts pungent-filiform; stamens equally inserted in throat, barely exserted.

22. *N. Breweri*.

Capsule 2-celled, valves separating from top downward into 2-4 segments; bracts glandular-puberulent.

23. *N. filicaulis*.

Leaves, at least the upper, not filiform, pinnately lobed or unequally cleft, terminal segment not elongate; branches stout and leafy; herbage markedly glandular to viscid, bracts often bearing yellowish globules of exudate.

Base of bracts broad, ovate.

Terminal segment of bract elongate and dissected at apex into 3 diverging, sharply acerose teeth.

Stamens unequally inserted, included; corolla-throat narrow.

24. *N. atractylodes*.

Stamens equally inserted, unequal in length, exserted; corolla-throat ample.

25. *N. hamata*.

Terminal segment of bract not elongate, the bract digitately lacerate into simple lobes.

26. *N. heterodora*.

Base of bracts narrower, linear to lanceolate.

Middle cauline leaves with rachis 1-5 mm. broad, bordered by few to numerous, opposite, equal, regularly spaced, short teeth or short-filiform lobes, only rarely bipinnate; corolla 9.5-17 mm. long; stamens 2.5-8 mm. long, unequal to subequal, the longest exserted.

27. *N. viscidula*.

Middle cauline leaves with rachis 1-2 mm. broad, dissected with numerous irregular, unequal, subulate lobes, usually proliferating from base, often crowded and bipinnate; corolla 6-12 mm. long; stamens subsessile to 4 mm. long, unequal to equal, included.

Corolla 9-12 mm.; capsule 3-4 mm.; plant with mephitic odor; stamens 1-4 mm. long.

28. *N. squarrosa*.

Corolla 6-7 mm.; capsule 2.5 mm.; plant with honeyscented odor; stamens 0.75-1.5 mm. long.

29. *N. mellita*.

1. *Navarretia leucocephala* Benth. White-flowered Navarretia. Fig. 3974.

Navarretia leucocephala Benth. Pl. Hartw. 324. 1843.

Erect to prostrate annual, 3-17 cm. high, stems white or reddish-streaked, simple or racemously branched, rarely proliferating from below the heads, glabrous to sparsely pubescent below, becoming densely pubescent above, with white, retrorse, crisped hairs. Lower leaves linear, pinnately lobed or entire, 1-8.5 cm. long, glabrous, lobes blunt to cuspidate, 3-10 mm. long, upper leaves pinnate to bipinnate, 0.5-5 cm. long, lobes cuspidate to acerose, glabrous to sparsely pubescent below; flowers sessile or subsessile in heads; bracts 0.4-1.5 cm. long, pinnate to bipinnate, proliferating on dorsal side between lobes, often ciliate, membranous-winged on margins and between lobes, outer bracts foliaceous; calyx 5-7 mm. long, cleft to base, sepals acerose, entire, pubescent about midway on dorsal side, rarely some of them with 2 teeth above, sinuses about three-quarters filled with membrane which is truncate and ciliate across top; corolla funnelform, 7-9.5 mm. long, white, tube 3.5-5.5 mm., throat 1.5-2 mm., lobes 1.5-2 mm.; stamens inserted equally about middle of throat, 2-5 mm. long, exserted; style exserted, stigma less than 0.25 mm. long, 2-lobed; capsule ovoid, 2.5 mm. long, indehiscent, locules 4-6-seeded.

Vernal pools; Lane County, Oregon, south in the Inner Coast Ranges to San Benito County, California, inland in the Sacramento and San Joaquin Valleys and in the Sierra Nevada foothills from Butte County south to El Dorado County; also Honey Lake Valley, Lassen County, California. Type locality: Sacramento Valley. April-June.

2. *Navarretia minima* Nutt. Least *Navarretia*. Fig. 3975.

Navarretia minima Nutt. Journ. Acad. Phila. II. 1: 160. 1848.

Gilia minima A. Gray, Proc. Amer. Acad. 8: 269. 1870.

Navarretia Suksdorfii Howell, Fl. N.W. Amer. 457. 1901.

Navarretia minima var. *Suksdorfii* Brand, Pflanzenreich 4350: 164. 1907.

Prostrate to suberect annual, 2.5–10 cm. high, with a spread of 1–11 cm., stems white or sometimes reddish-tinged, simple, caespitose or divaricately branched, pubescent with white, crisped, retrorse hairs. Lower leaves linear, entire, or pinnately dissected, cuspidate, 1–1.5 cm. long, glabrous, upper 1–2.5 cm. long, linear, entire or pinnate with 1–3 pairs of lobes, acerose; inflorescence capitate; bracts 0.7–1.7 cm. long, pinnate with 1 to several pairs of acerose lobes, base of rachis membranous-winged, pubescent inside at base; calyx 4–5 mm. long, cleft to base, sepals usually entire, unequal, acerose, sparsely pubescent on dorsal side below, sinuses one-half or more filled by membrane; corolla funnelform, 4–6 mm. long, white, tube 2–2.5 mm. long, throat 1–1.5 mm., lobes 1–2 mm.; stamens equally inserted in middle of throat, 2.5–3 mm. long, exserted; style exserted, stigma less than 0.25 mm. long, 2-lobed; capsule ovoid, 2 mm. long, indehiscent.

Eastern Washington, south to the northern Sierra Nevada, California. Type locality: "Plains of the Oregon, near Walla-Walla." July–Aug.

3. *Navarretia pauciflora* H. L. Mason. Few-flowered *Navarretia*. Fig. 3976.

Navarretia pauciflora H. L. Mason, Madroño 8: 200. 1946.

Prostrate annual, 1–4 cm. high and spreading 2–8 cm.; hypocotyl with a thick spongy cortex; stems slender, filiform, 0.2–0.5 mm. thick, white with streaks of purple, densely clothed with short white retrorse crisped hairs or almost glabrous. Leaves 1–2.5 cm. long, linear and entire or pinnately parted into 1 or 2 pairs of linear cuspidate lobes each about 2 mm. long, glabrous; outer bracts foliaceous, few, 1.5–3 times the head, with several pairs of lobes below the middle, membranous-winged below, those within the head little exceeding the calyx, membranes ciliate-margined, lobes acerose to cuspidate; flowers sessile or subsessile in 2–10-flowered heads, heads 4–10 mm. broad; calyx cylindric, 4–5 mm. long, membranous except for the lobes and the narrow band of tissue below them, this often reduced to a single vascular strand, membrane in the sinus truncate across the top and ciliate on the upper margin, lobes pubescent within; corolla funnelform, 5–6 mm. long, blue or white, fading blue, tube 3 mm., throat 1.5 mm., lobes 1.5 mm. long; stamens inserted in the sinuses of corolla-lobes, equal in length, somewhat exceeding the petals and well-exserted from throat; stigma exserted, 2-lobed, lobes minute; capsule irregularly dehiscent, the somewhat thickened top falling away irregularly from the membranous sidewalls, seeds 1 to several, minutely pitted, reddish brown.

Known only from the type locality, vernal pool in volcanic rubble, 5 miles north of Lower Lake, Lake County, California. June.

4. *Navarretia plieantha* H. L. Mason. Many-flowered *Navarretia*. Fig. 3977.

Navarretia plicantha H. L. Mason, Madroño 8: 199. 1946.

Prostrate annual forming a mat 5–20 cm. broad with several stout branches but not proliferating from below a central head, the main axis often with crisped retrorse hairs, lateral stems glabrate, the epidermis often exfoliating as a white membrane-like tissue. Leaves 3–4 cm. long, linear and entire or pinnate with a few remote filiform lobes; outer bracts foliaceous, 3 or 4 to each head, 1–2 times the head, pinnate, the lobes often proliferated 2–4 times or the bract simple-pinnate, rachis flanked by a ciliate membrane below, bracts within the inflorescence with from 1 to several pairs of lobes below the middle, entire above or with a pair of acerose teeth; flowers in heads 1.5–2 cm. broad, heads 20–50-flowered; calyx somewhat constricted above, 4–5 mm. long, membranous throughout except for the herbaceous lobes and a line of herbaceous tissue immediately below the lobes, glabrous or with a few weak hairs except for the ciliate margin of the truncated membrane in the sinus of calyx-lobes; corolla 5–6 mm. long, blue, funnelform, tube 3–3.5 mm. long, included in calyx-tube, throat 0.5 mm., lobes 2 mm. long; stamens inserted in the sinuses of the corolla-lobes, 2.5 mm. long; stigma exserted, 2-cleft to 2-lobed or entire; capsule not regularly dehiscent, the somewhat thickened top breaking away irregularly from the membranous walls when wetted, the seeds working out of the constricted orifice of the calyx and resting on top; seeds about 3 to each capsule, reddish brown and minutely pitted.

Known only from the type locality, in peaty soil, Boggs Lake, northwest slope of Mount Hannah, Lake County, California. June.

5. *Navarretia Bakeri* H. L. Mason. Baker's *Navarretia*. Fig. 3978.

Navarretia Bakeri H. L. Mason, Madroño 8: 198. 1946.

Erect spreading annual, 2–5 cm. high; stems racemously branched, 0.5–1.5 mm. thick, densely clothed with retrorse crisped hairs. Lower leaves linear, entire to few-toothed or pinnatifid, upper dissected, lobes often proliferating, glabrate below, pilose with short, crisped hairs above; outer bracts foliaceous, pinnatifid with highly dissected proliferations; bracts within head pinnate with 1–2 pairs of teeth in upper third and 1 pair of lobes below middle with proliferating lobes from their bases or from the dorsal surface of the rachis; flowers in heads; calyx-lobes unequal, the longest lobes 5.5 mm., slender-aristate, with a few weak hairs, membranous to base in sinuses, free margin of membrane ciliate; corolla white, 5–7 mm. long, tube 4 mm., throat 0.5–1 mm., lobes 1–1.5 mm. long; stamens inserted in the sinuses of corolla-lobes, 2.5 mm. long, exserted from throat; style exserted, stigma minutely 2-lobed; capsule about 2 mm. long, the

somewhat thickened top breaking away irregularly circumscissilely from the membranous base; seeds few, minutely pitted, reddish brown.

Vernal pools in meadows of the Inner North Coast Ranges from Lake County to Trinity County, California. Type locality: 1.5 miles southwest of Lower Lake, Lake County, California. June-July.

6. *Navarretia prostrata* (A. Gray) Greene. Prostrate Navarretia. Fig. 3979.

Gilia prostrata A. Gray, Proc. Amer. Acad. 17: 223. 1881.

Navarretia prostrata Greene, Pittonia 1: 130. 1887.

Prostrate annual with spread of 8-15 cm., branches proliferating from beneath a terminal acaulescent head; stems white, densely pubescent with white retrorse hairs below heads, becoming almost glabrous at base. Leaves 3-7 cm. long, pinnately to bipinnately lobed with linear rachis, longest lobes above, glabrous; inflorescence capitate; outer bracts foliaceous, simple-pinnate, 1-4 cm. long, glabrous or sparingly pubescent ventrally, inner pinnately toothed above, often trifid, at base coriaceous, ciliate, membranous-margined and pubescent; flowers sessile; calyx 4-5 mm. long, cleft to base, calyx-lobes entire or some trifid at apex, pubescent dorsally mostly below middle, united by a sinus-membrane about two-thirds of their length to form a pseudotube, membrane ciliate at top; corolla broadly funnelform, white to violet, 7.5-8.5 mm. long, tube 5-5.5 mm., throat 1-1.5 mm., lobes 1.5-2 mm.; stamens equally inserted in sinuses, 2.5 mm. long, exserted; style exserted, stigma minute, slightly 2-lobed; capsule 2-celled, indehiscent, many-seeded.

Southern Monterey County, through coastal southern California to Los Angeles County, California. Type locality: near Los Angeles. May-July.

7. *Navarretia intertexta* (Benth.) Hook. Needle-leaved Navarretia. Fig. 3980.

Aegochloa intertexta Benth. Bot. Reg. 19: under pl. 1622. 1833.

Navarretia intertexta Hook. Fl. Bor. Amer. 2: 75. 1838.

Gilia intertexta Steudel, Nom. 1: 683. 1840.

Navarretia stricta Howell, Fl. N.W. Amer. 456. 1901.

Navarretia pilosifaucis St. John & Weitman, Proc. Biol. Soc. Wash. 41: 196. 1928.

Erect annual, 2-20 cm. high, stems brown, simple or branched, puberulent with white, crisped, retrorse hairs to glabrate; cotyledons linear to linear-lanceolate. Leaves 1-5 cm. long, pinnatifid, some of the lobes tending to proliferate, occasionally the basal leaves simple and linear; inflorescence capitate-congested; bracts 7-20 mm. long with a broad rachis, conspicuously and coarsely shaggy white-pilose, pinnatifid, lobes stiffly acerose; calyx 8-10 mm. long, cleft to base, lobes unequal, simple or the longer with 2-4 lateral teeth, narrowing to a vein and joined in lower three-quarters by a membrane, pseudotube "closed" by a tuft of hairs within each sepal; corolla slender-funnelform, white to pale blue, exceeding the calyx, 4-9 mm. long, tube 2 mm., throat 1-1.5 mm., lobes 4-6 mm. long; stamens equally inserted on base of throat, unequally exserted; style usually exserted, often exceeding stamens, stigma to 0.5 mm., 2-lobed; capsule 1-celled, membranous below, several-seeded; seeds dark brown, pitted, irregularly angled.

West of the Cascades from Vancouver Island, British Columbia, to foothills and valleys of northern California; Cuyamaca, San Diego County, California. Type locality: "California and North-West America." Collected by Douglas. May-July.

8. *Navarretia propinqua* Suksd. Great Basin Navarretia. Fig. 3981.

Navarretia propinqua Suksd. Allg. Bot. Zeit. 12: 26. 1906.

Navarretia intertexta var. *propinqua* Brand, Pflanzenreich 4²⁶⁰: 163. 1907.

Navarretia intertexta var. *alpina* Brand, loc. cit.

Low spreading, rarely erect annual, 2-10 cm. high by 2-25 cm. broad, stems brown, branching from base or racemose or divaricate, lower branches prostrate, puberulent with white, crisped, retrorse hairs. Leaves 1.5-4 cm. long, pinnate or bipinnate with several remote pairs of lobes, each with a somewhat calloused subulate tip, the upper shorter, forked or bipinnate, becoming bracteate, lobes stiffly acerose; inflorescence capitate-congested; bracts 5-10 mm. long with broad scutelliform, coriaceous base, pilose along margins, between lobes and dorsally below, pinnate or bipinnately forked, lobes stiffly acerose, some borne dorsally, almost perpendicular to axis; calyx 7-9 mm. long, cleft to base, pilose, sepals acerose, unequal, three short, two long, the latter often with 1 or 2 sharp teeth toward tip, narrowing to a vein below and joined in lower half to three-quarters by a membrane, pseudotube "closed" by a tuft of hairs within each sepal; corolla slender-funnelform, white, subequaling the calyx, tube 3.5 mm. long, throat 0.5-1 mm., lobes 0.5-1 mm.; stamens equally inserted at base of throat, unequally exserted; style exserted, stigma to 0.5 mm. long, 2-lobed; capsule indehiscent, membranous below, 2 mm. long, 1-celled, several-seeded; seeds dark brown, pitted, irregular in shape.

East of the crest of the Cascades and the Sierra Nevada, from northern Washington to Lake Tahoe, California, east to Idaho, Wyoming, North Dakota, Arizona, and New Mexico. Type locality: Spokane County, Washington. June-Sept.

9. *Navarretia tagetina* Greene. Marigold Navarretia. Fig. 3982.

Navarretia tagetina Greene, Pittonia 1: 137. 1887.

Navarretia erecta Heller, Muhlenbergia 1: 146. 1900.

Navarretia kikitatensis Suksd. Deutsch. Bot. Monatss. 18: 133. 1900.

Gilia kikitatensis Suksd. loc. cit.

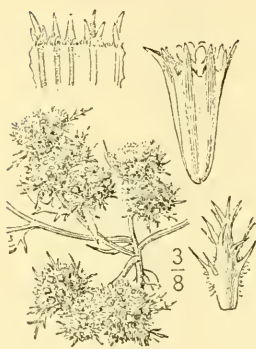
Navarretia pubescens var. *tagetina* Jepson, Man. Fl. Pl. Calif. 789. 1900.

Navarretia Savagei Henderson, Rhodora 33: 205. 1931.

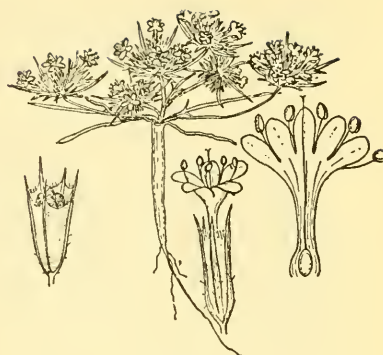
Erect annual, 6-27 cm. tall, simple or racemously branched, glabrous to puberulent below



3974



3975



3976



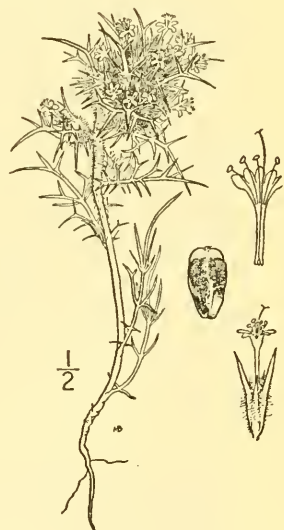
3977



3978



3979



3980

3974. *Navarretia leucocephala*3975. *Navarretia minima*3976. *Navarretia pauciflora*3977. *Navarretia plieantha*3978. *Navarretia Bakeri*3979. *Navarretia prostrata*3980. *Navarretia intertexta*

with short white retrorse hairs, becoming sublanate below inflorescence. Leaves alternate to occasionally opposite, the lower pinnately or bipinnately lobed, 2.5–5 cm. long, with slender cuspidate lobes, the upper bipinnate to tripinnate becoming bracteate with broader rachis and terminal lobes toothed along margins, 15–30 mm. long, densely puberulent at base; bracts rigid and cup-shaped at base, lobes often proliferating from dorsal side, 10–23 mm. long, densely white-pubescent toward base; flowers sessile in heads at ends of branches; calyx 7.5–10 mm. long, lobes rigidly acerose, unequal, 3–5-toothed above tube formed by sinus-membrane, dorsal side pubescent both on lobes and membrane, the ventral only immediately below sinuses; corolla funnelform, pale blue, 9.5–10.5 mm. long, tube 6–7 mm. long, throat 1–2 mm., lobes 2–2.5 mm.; stamens inserted at base or lower half of throat, 2–2.5 mm. long, exerted from throat; stigma 3-lobed, included, 0.5 mm. long; capsule ovoid, 3 mm. long, locules 1- to several-seeded with dark brown, pitted seeds.

Klickitat County, Washington, to North Coast Ranges of California and borders of Sacramento Valley to Napa and Amador Counties; also San Diego County, California. Type locality: Siskiyou County, California. April–July.

10. *Navarretia subuligera* Greene. Awl-leaved Navarretia. Fig. 3983.

Navarretia subuligera Greene, Pittonia 1: 137. 1887.

Erect, simple or branched, sometimes tufted annual, 3–15 cm. high, stems puberulent to retrorse short-pilose. Leaves pinnatifid into filiform segments with 1–2 pairs of lobes, glabrous to puberulent toward the base, upper leaves becoming rigidly spinose-pinnatifid; inflorescence capitate or a series of heads on short peduncles; bracts broadly ovate with slender spiny lobes, some proliferating, the rachis coriaceous, ovate and often keeled from the back, closely investing a few flowers to form a sort of bur, glabrous except for the ciliate margin and for the inner face at the top of the rachis; calyx of 5 unequal lobes, 2 simple and acerose, the other 3 often reduced to teeth, the lobes hairy within at the junction of the membrane; corolla white, very small, narrowly funnelform, equaling or subequaling the longest calyx-lobe, throat 1.5 mm. long, lobes 1 mm.; stamens inserted near the base of the throat and included, anthers minute, filaments equal or unequal; style included, stigma 3-lobed; capsule membranous.

Rocky plains bordering the Sacramento Valley, also Mount St. Helena, California, apparently very rare. Type locality: "Amador County," California. May–June.

11. *Navarretia cotulaefolia* (Benth.) Hook. & Arn. Cotula Navarretia. Fig. 3984.

Aegochloa cotulaefolia Benth. Bot. Reg. 19: under pl. 1622. 1833.

Navarretia cotulaefolia Hook. & Arn. Bot. Beechey 368. 1838.

Navarretia Bowmaniae Eastw. Bot. Gaz. 37: 444. 1904. Not *N. Bowmaniae* of Jepson, Fl. Calif. 3: 151. 1943.

Erect annual, 4–25 cm. tall, stems reddish, simple or divaricately branched, puberulent to glabrate. Lower leaves 2–3.5 cm. long, pinnate or bipinnate with about 5 pairs of minutely cuspidate lobes, but often entire below the middle, rachis and lobes linear, puberulent, upper leaves 1.5–4.5 cm. long, becoming bracteate with rachis somewhat broader; inflorescence capitate; bracts to 1 cm. long, broad and coriaceous with 2–7 pairs of acerose lobes coarsely villous with broad white hairs; flowers sessile; calyx cleft to base with 4 unequal lobes, 2 long and 2 short, 5.5–7 mm., the longer usually with a pair of acerose teeth near apex, puberulent, but with a few long coarse hairs about midway, sinus-membrane forming a pseudotube 3–4 mm. long; corolla funnelform, 4-lobed, yellow to cream-colored, 9–10.5 mm. long, tube 5–6 mm., throat 2–3 mm., lobes 1–1.5 mm.; stamens 4, inserted equally in or below the sinuses, 3 mm. long, exerted; style exerted, stigma 2-lobed, to 0.5 mm. long; capsule 4-valved, 1-celled, dehiscent from base, obovoid, 2 mm. long; seeds obovoid, light brown, 1 in each capsule.

Inner Coast Ranges of California from Mendocino County to San Benito County, inland to the western borders of the Sacramento Valley. Type locality: "California." Collected by Douglas. May–June.

12. *Navarretia nigellaefórmis* Greene. Adobe Navarretia. Fig. 3985.

Navarretia nigellaefórmis Greene, Pittonia 1: 132. 1887.

Navarretia ocellata Eastw. Zoe 5: 88. 1900.

Navarretia nigellaefórmis var. *radians* J. T. Howell, Leaflets West. Bot. 2: 136. 1938.

Erect or spreading annual, 4–27 cm. high; stems white or reddish, simple, branched from base or racemously branched, pubescent with short white retrorse hairs. Leaves with slender rachis, 1–3 cm. long, bipinnately lobed, acerose to cuspidate, becoming bracteate above, glabrate to coarsely pubescent at base and short-pubescent toward tips; flowers sessile in heads terminating the branches; bracts 5–20 mm. long, similar to leaves but more rigid, acerose, and with expanded rachis and proliferating lobes, coarsely white-pubescent or glandular at base; calyx 7–13 mm. long, coarsely pubescent above, cleft to base into unequal, entire or toothed lobes, sinus-membrane forming pseudotube in lower half to two-thirds; corolla funnelform, yellow with a purple spot at base of each lobe, 9–14 mm. long, tube 6–9 mm., throat 1.5–3 mm., lobes 1.5–2 mm.; stamens equally to unequally inserted in lower half of throat, 1–5 mm. long, usually exerted; stigma 2-lobed, 0.5–1 mm. long, included or exerted; ovary 2-celled or capsule becoming 1-celled by abortion or by breaking the partition; mature capsule 2–3 mm. long, containing irregularly angled, brown seeds.

Inner Coast Ranges in California from Contra Costa County south to San Luis Obispo County; east side of Sacramento Valley, from Butte County to Tulare County, California. Type locality: near Visalia, California. April–May.

13. *Navarretia eriocephala* H. L. Mason. Hoary Navarretia. Fig. 3986.

Navarretia eriocephala H. L. Mason, Madroño 8: 196. 1946.

Erect annual, 5–25 cm. high, stems tan to reddish brown, simple or racemously branched, densely white-canescens with retrorse hairs. Leaves bipinnately dissected, often with a stout broad or sometimes narrow rachis, 1–5 mm. long, puberulent; bracts stiff-coriaceous, bipinnately dissected into linear, acerose lobes, the rachis expanded below, densely white-villous below; flowers in heads, 5-merous; calyx unequally cleft, some lobes entire, others 3-lobed or toothed, 6–8 mm. long, densely white-coarse-villous above, glabrate below; corolla funnelform, 8–12 mm. long, cream-yellow and often spotted or marked with purple, tube 6 mm., throat 3 mm., lobes 3 mm. long; stamens equally inserted on the throat, filaments unequal in length, 1–3 mm. long, exserted from throat; stigma exserted, 2-lobed, lobes 0.5 mm. long; capsules obovoid, 4-valved, 1-celled, 1-seeded, seed brown, smooth or slightly furrowed.

Foothills of the northern Sierra Nevada, California, Calaveras County to Eldorado and Sacramento Counties; Solano County, California. Type locality: Folsom, Sacramento County. May–July.

14. *Navarretia heterandra* H. L. Mason. Tehama Navarretia. Fig. 3987.

Navarretia heterandra H. L. Mason, Madroño 8: 197. 1946.

Plants simple or branched from the base, erect or radiately spreading, 3–20 cm. high, stems densely white-canescens with minute, retrorse hairs. Leaves bipinnately dissected, the lobes and rachis slender, lobes of the lower leaves soft-herbaceous becoming pungent and rigid on upper leaves; bracts divaricately pinnatifid with rigid, acerose lobes, densely white-villous below with coarse white hairs; flowers sessile in clusters, these aggregated into heads, 4-merous or occasionally one or two 5-merous in the same head; calyx unequally cleft, some to the base, others only two-thirds to base, lobes unequal, usually 3 entire and 2 with lateral teeth or short lobes; sinus-membranes unequal, calyx-tube white-villous above, glabrate on lower half; corolla subequaling longest sepals, 5–7 mm. long, white or blue, tube 4–5 mm. long, sometimes pubescent, throat 1 mm. long, lobes 1 mm. long; stamens unequally inserted on the throat, 0.5–1 mm. long, filaments unequal, anther 0.5 mm. long, included; stigma 2-lobed, included; capsule 4-valved, 1-celled, 1-seeded, seed brown, smooth or slightly furrowed.

Northern and western borders of the Sacramento Valley in Shasta, Tehama, and Lake Counties, California. Type locality: "Near Cottonwood, Tehama Co." [Shasta County], California. June.

15. *Navarretia Jepsónii* V. Bailey. Jepson's Navarretia. Fig. 3988.

Navarretia Jepsónii V. Bailey ex Jepson, Fl. Calif. 3: 154. 1943.

Erect, ascending, or more often broadly spreading annual, herbage often with a reddish or purple pigment. Leaves finely dissected into short linear acerose lobes, which are forked and often proliferate from the base; inflorescence capitate, bracts with a broad oblong rachis, finely dissected into linear acerose lobes, coarsely pilose with papery multicellular hairs, outer bracts red or red-tipped; calyx deeply cleft into linear acerose lobes or the longer with a few lateral teeth near the tip, sinus with a membrane in lower part which ascends the margins of the lobes, lobes coarsely pilose, the tube puberulent; corolla funnelform, 10 mm. long, tube 5 mm., white, throat 2.5 mm., ample and rounded, white, the lobes 2.5 mm., blue with a purple spot at base of each; stamens inserted at base of throat, filaments 8 mm. long, anther 1 mm., white; style long-exserted, stigma 2-lobed; capsule obovoid, thin-walled, almost membranous, circumscissile about the base and splitting upward into 8 valves.

Coast Ranges from Colusa County to Napa County, and eastern borders of Sacramento Valley, California. Type locality: Coyote Valley, southern Lake County, California. June–July.

16. *Navarretia setiloba* Coville. Coville's Navarretia. Fig. 3989.

Navarretia setiloba Coville, Contr. U.S. Nat. Herb. 4: 153. 1893.

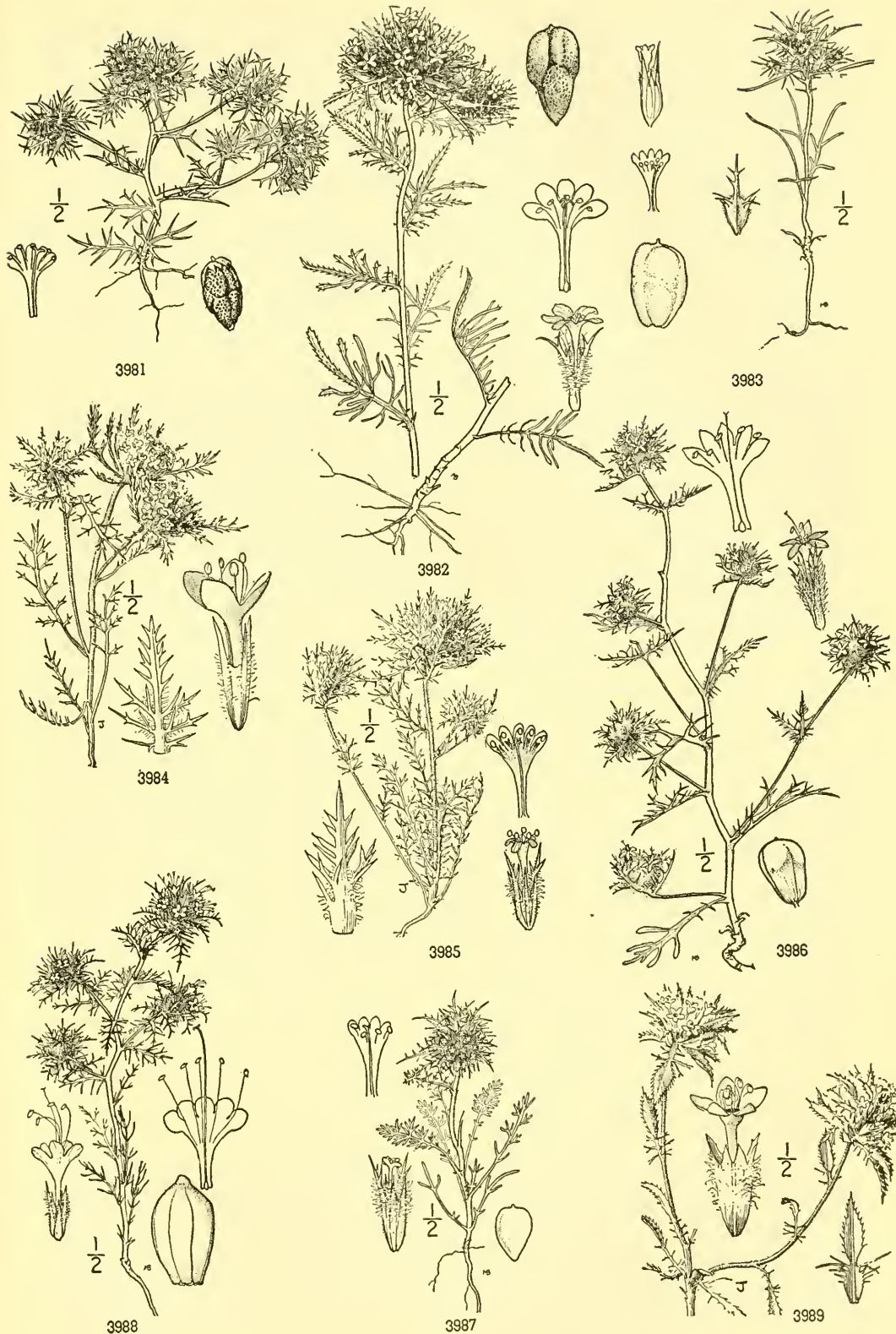
Erect annual, 8–21 cm. high, simple, racemously branched or occasionally branched from base, stems white, purplish-tinged, minutely puberulent. Leaves linear, bipinnately lobed, lobes often 2-forked from near base, and often lying in a plane perpendicular to that of central portion of leaf, terminal lobe broad, often purple, sharply serrate, 13–25 mm. long, puberulent; calyx 7–10 mm. long, cleft to base, the sinuses over half-filled with a membrane, puberulent, with a ring of coarser hairs above the middle on ventral and often on dorsal sides; corolla funnelform, 10–11 mm. long, tube 4.5–5 mm., throat 3–3.5 mm., lobes 2.5–3 mm.; stamens inserted in lower third of throat, 5 mm. long, well-exserted; stigma 2-lobed, 0.5 mm. long, exserted; capsule 4-angled, ovoid, 2.5–4 mm. long, the wall chartaceous in upper half or third, membranous below, upper half breaking away from the lower and separating also at the valves; seeds ovoid, 4-angled, 1 to a locule.

Mountains of Kern County, California, between Kernville and Caliente. Type locality: divide between Kernville and Havilah, Kern County. June.

17. *Navarretia mitracarpa* Greene. Mitre-fruited Navarretia. Fig. 3990.

Navarretia mitracarpa Greene, Pittonia 1: 135. 1887.

Spreading or prostrate annual, 2–15 cm. high; stems filiform, brown, cinereous-pubescent, frequently glandular; branching chiefly from the base, divaricate and often profuse; cotyledons 2–3-lobed. Leaves pinnately or bipinnately dissected with simple or occasionally 2–3-fascicled, acicular, spinescent, 2-forked lobes, these lying in a plane perpendicular to that of rachis, rachis



3981. *Navarretia propinqua*
 3982. *Navarretia tagetina*
 3983. *Navarretia subuligera*

3984. *Navarretia cotulaefolia*
 3985. *Navarretia nigellaeformis*
 3986. *Navarretia eriocephala*

3987. *Navarretia heterandra*
 3988. *Navarretia Jepsonii*
 3989. *Navarretia setiloba*

expanded and marginally toothed above middle; inflorescence capitate, 1.5–2.5 cm. broad; bracts similar to leaves but shortened, more rigid, less dissected, 5–15 mm. long, often glandular; calyx rigid, chartaceous, hispid with white hairs, sepals unequal, 5–9 mm. long, entire or 3–5-lobed, sinus-membrane very narrow but growing with the capsule; corolla funnelform, 7–11 mm. long, the tube 3.5–7 mm., white, throat 1–2 mm., white, lobes 2–3 mm., purple to pink; stamens equally or subequally inserted on base of throat, 5–8 mm. long, exceeding the lobes; style exerted, stigma less than 0.5 mm. long, 2-lobed; capsule obovoid, 4-angled above, with locular thickening, 4-valved, walls rigid, often with a short stout beak, incompletely 2-celled, becoming 1-celled by rupture of partition; seeds 1, 4-angled.

Inner South Coast Ranges, Monterey County to Santa Barbara County, inland to Fresno and Tulare Counties, California. Type locality: "somewhere in Lake County, California." May–June.

Navarretia mitracarpa subsp. *Jaredii* (Eastw.) H. L. Mason. (*Navarretia Jaredii* Eastw. Zoe 5: 89. 1900; *Gilia Jaredii* K. Sch. in Just, Bot. Jahresb. 28: 489. 1902.) Stem erect, stout, simple or virgately branched from near base; inflorescence 2–3.5 cm. broad. Paso Robles, California. Type locality: Paso Robles Creek, San Luis Obispo County, California.

18. *Navarretia pubescens* (Benth.) Hook. & Arn. Downy *Navarretia*. Fig. 3991.

Aegochloa pubescens Benth. Bot. Reg. 19: under pl. 1622. 1833.

Gilia pubescens Steudel, Nom. ed. 2. 1: 683. 1840.

Navarretia pubescens Hook. & Arn. Bot. Beechey 368. 1840.

Erect annual 8–40 cm. high, stems simple or branched from base or racemously branched above, retrorse-canescens and with scattered gland-tipped hairs. Leaves sessile, pinnately to bipinnately dissected, the ultimate divisions short-ovate-lanceolate in outline, 2–6 cm. long, rachis occasionally somewhat flattened and expanded toward tip, especially on upper leaves, then lacinate; inflorescence capitate; bracts leaf-like, the rachis prominent and often broad, the lobes pungent, densely glandular-villous; flowers sessile; calyx about 1 cm. long, the lobes unequal, the longest often toothed or lobed, the shorter simple, all ribbed on the back and chartaceous below, sinus-membranes below lobes densely pilose with weak, gland-tipped hairs; corolla funnelform, blue with violet or purple veins or frequently with tube and throat white, 10–14 mm. long, tube 6 mm., throat 5 mm. with hyaline area below the sinuses becoming distended in age, lobes 2.5 mm., broadly oblong, tip obtuse, pilose exteriorly throughout; stamens equally or subequally inserted on base of throat, unequal in length, included to well-exserted, anthers and pollen cream-white; style included, 2-cleft; capsule chartaceous throughout, circumscissile at base, 1-celled, 4-valved, valves persistent; seeds 1–2 in each capsule.

Valleys and foothills; Sierra Nevada from Butte County to Kern County, and Coast Ranges from Humboldt County to San Luis Obispo County, California. Type locality: "California." Collected by Douglas. May–June.

19. *Navarretia prolifera* Greene. Bur *Navarretia*. Fig. 3992.

Navarretia prolifera Greene, Pittonia 1: 135. 1887.

Erect annual 8–18 cm. high, stems brown, glabrous to puberulent, divaricately branched, with mostly leafless branches proliferating from beneath the capitate inflorescence. Lower leaves 2–4 cm. long, entire or pinnate with 2–4 pairs of short remote, cuspidate lobes, sparsely puberulent, upper 1.2–2 cm. long, pinnate with 1–3 pairs of lobes near base and terminal segment elongate, or becoming bracteate above and palmately 3–7-cleft, villous in sinuses of lobes; bracts 3–10 mm. long, with broad, coriaceous rachis, palmately 5–8-cleft into acerose lobes, densely coarse-villous dorsally and just above sinuses, subglabrous beyond to tips; calyx 5–7 mm. long, cleft to base into unequal acerose lobes, these hyaline below middle and joined by a membrane to form a pseudotube 1.5–2 mm. long, pubescence as of the bracts, and forming a tuft midway on each segment; corolla funnelform, 1 cm. long, well exceeding calyx, tube 5 mm., throat 2 mm., lobes 2.5 mm., blue or purple, tube and throat lighter; stamens inserted in upper half of throat, 2–4 mm. long, unequal, the longest just exerted; style exerted, stigma 0.5 mm. long, 3-lobed; capsule ovoid, papery-walled, 2 mm. long, 3-celled; seeds brown, ovoid, shallow-pitted, several in each cell.

Tulare and Amador Counties, California. Type locality: near Visalia, California. May–June.

Navarretia prolifera subsp. *lutea* (Brand) H. L. Mason. (*Navarretia prolifera* var. *lutea* Brand, Ann. Conserv. & Jard. Bot. Genève 15: 338. 1913.) Corolla bright yellow. West central Eldorado County, 2,500 to 4,000 feet, California. Type locality: Camino, Eldorado County, California.

20. *Navarretia divaricata* (Torr.) Greene. Mountain *Navarretia*. Fig. 3993.

Gilia divaricata Torr. ex A. Gray, Proc. Amer. Acad. 8: 270. 1870.

Navarretia divaricata Greene, Pittonia 1: 136. 1887.

Navarretia prolifera var. *breviflora* M. E. Peck, Proc. Biol. Soc. Wash. 50: 94. 1937.

Erect or spreading annual, 1–15 cm. high, often with a spread of 1–25 cm., stems simple or divaricately branched, typically proliferating from below the terminal heads, glabrous to slightly glandular-puberulent toward the inflorescence; cotyledons terete, linear, connate at base. Leaves simple to subpinnately lobed, the middle lobe longest, the lateral lobes from near the base, occasionally one or more of the lobes bipartite or proliferating; inflorescence capitate on slender brown wiry stems; bracts palmately lobed, the middle lobe 1–4 times the lateral, simple or bipartite, tipped with an acerose callous spine, pilose in the sinuses, becoming glabrate above; calyx 4–7 mm. long, cleft into unequal, simple, acerose lobes, united in low third or half by sinus-membrane, white-pilose to villous on the lower half; corolla salverform to short-funnelform, occasionally the throat appearing somewhat swollen when dry, white or deep blue or tube and throat yellow and the lobes pink or lavender, 3.5–4.5 mm. long, tube 2–2.5 mm., throat 1–2 mm., lobes 0.5 mm.; stamens unequally to subequally inserted on throat, included, anthers

equal to or longer than filaments; style and stigma included, stigma 3-lobed, minute to 0.5 mm. long; capsule 2–2.5 mm. long, 3-celled, circumscissile around the base, the valves dehiscing from the base upward; seeds 1–3 per locule, lenticular to sharply angled.

Central Idaho and the Cascade Mountains, southern Oregon, south in the Coast Ranges to Lake County, California, and in the Sierra Nevada to Tulare County; also eastern Santa Barbara County, California. Type locality: "California, along the foot hills of the Sierra Nevada." June–Aug.

Navarretia divaricata subsp. *vividior* (Jepson & Bailey) H. L. Mason. (*Navarretia divaricata* var. *vividior* Jepson & Bailey ex Jepson, Fl. Calif. 3: 156. 1943.) Stems red-brown; inner bract-segments glandular-puberulent almost to tips; corolla 5–7.5 mm. long, deep blue. Lake County, Oregon, south through Modoc County, California, to Shasta County and south on the west slope of the Sierra Nevada to Tuolumne and Mariposa Counties; and in the Coast Ranges, from Humboldt County to Lake County, California. Type locality: Mount Hanna, Lake County.

21. *Navarretia peninsularis* Greene. Baja Navarretia. Fig. 3994.

Navarretia peninsularis Greene, Pittonia 1: 136. 1887.

Gilia MacGregorii Brand, Ann. Conserv. & Jard. Bot. Genève 15: 339. 1913.

Gilia peninsularis Munz, Man. S. Calif. 400. 1935.

Navarretia divaricata of Jepson, Fl. Calif. 3: 156. 1943.

Erect or spreading annual, 4–25 cm. high, stems slender, wiry, with long internodes, divaricately branching, sparsely pilose and glandular. Leaves 1–3 cm. long, irregularly pinnatifid, the lower lobes tending to proliferate, segments linear with acerose tips, terminal segment elongate, sometimes becoming lanceolate, entire or with a few teeth; flowers sessile in heads at the ends of slender wiry branches and sometimes with 2 or 3 small heads racemously disposed below, the lower internodes of the branch often much-elongated; bracts similar to leaves but with a much-shortened rachis, the secondary lobes often somewhat recurved or reflexed on the rachis; calyx-segments simple or occasionally toothed, unequal, linear-acerose, 4–5 mm. long, sparsely pilose with weak white hairs, with a hyaline membrane in the sinuses to form the pseudotube, membrane at length distended or ruptured by the capsule; corolla a little longer than the longest sepal, at length pushed out by the growing capsule, funnelform, 6–8 mm. long, pale-purplish, tube 4 mm. long, becoming distended below by the growing capsule, lobes subequaling the throat, 2 mm. long; stamens equally inserted, unequal in length, anthers barely exerted or included; style included, stigma 3-lobed; capsule chartaceous, oblong, dehiscent from the base, the valves at length separating, the sutures thickened, 3 mm. long, 3-celled, cells 6–7-seeded; seeds angled, obscurely pitted.

Tehachapi and San Bernardino Mountains, California, to northern Lower California. Type locality: "Hansen's Ranch," northern Lower California. June–Aug.

22. *Navarretia Brèweri* (A. Gray) Greene. Brewer's Navarretia. Fig. 3995.

Gilia Breweri A. Gray, Proc. Amer. Acad. 8: 269. 1870.

Navarretia Breweri Greene, Pittonia 1: 137. 1887.

Erect annual 2–10 cm. high, crown as broad as high, stems reddish, simple or divaricately branched, minutely puberulent and somewhat glandular; cotyledons about 8 mm. long, connate at base. Leaves 8–15 mm. long, pinnate with about 2 pairs of acerose, often bipartite, lobes, rachis 1 mm. wide or less; inflorescence capitate; bracts similar to leaves but often tripartite, glandular-puberulent; calyx 6–10 mm. long, cleft to base, sepals acerose, unequal, united by sinus-membrane to form a pseudotube 1–2.5 mm. long, glandular-puberulent; corolla funnelform, yellow, about 7 mm. long, tube 5 mm., throat 1 mm., lobes 1 mm.; stamens equally inserted at throat, about 2.5 mm. long, barely exerted; stigma included, 3-lobed, 0.5 mm. long; capsule plump, ovate, 2–3 mm. long, 3-loculed, with 1–3 brown seeds in each locule.

Eastern slopes of the Cascades and the Sierra Nevada from Wasco County, Oregon, to Tulare County, California, east to Idaho, Nevada, Utah, and Arizona. Type locality: Ebbetts and Amador Passes, California. June–Aug.

23. *Navarretia filicaulis* (Torr.) Greene. Thread-stemmed Navarretia. Fig. 3996.

Gilia filicaulis Torr. ex A. Gray, Proc. Amer. Acad. 8: 270. 1870.

Navarretia filicaulis Greene, Pittonia 1: 134. 1887.

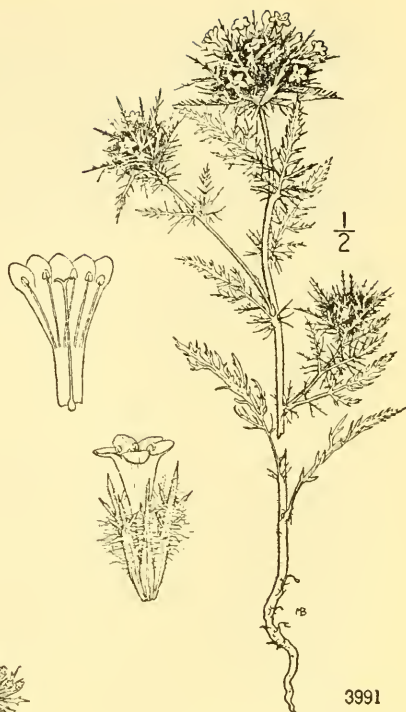
Navarretia dubia Brand, Pflanzenreich 4250: 157. 1907.

Erect annual, 8–19 cm. high, stems filiform, brown, sparsely puberulent to glandular throughout; branching racemose to paniculate. Leaves filiform, entire or with 1–4 short, filiform or cuspidate lobes from near the base, either crowded or remote, much-exceeded by the middle lobe, lower leaves 1–3 cm. long, the upper 1–1.7 cm. long; inflorescence capitate at the ends of filiform branches; bracts 4–10 mm. long, palmately 3–5-cleft, middle lobe acuminate to attenuate, acerose; calyx 3–5 mm. long, glandular-puberulent with unequal acerose lobes, pseudotube 1–1.5 mm. long; corolla funnelform, 5–6 mm. long, violet, tube 2.5–3 mm., throat 1.5 mm., lobes 1–1.5 mm.; stamens equally inserted at base of throat, 4–6 mm. long, exerted; style exerted, stigma capitate to minutely 2-lobed; capsule ovoid, 2 mm. long, 2-celled, thin-papery-walled, valves separating at maturity into 2 or 4 discrete segments, locules 1–2-seeded with brown, ovoid or irregularly angled seeds.

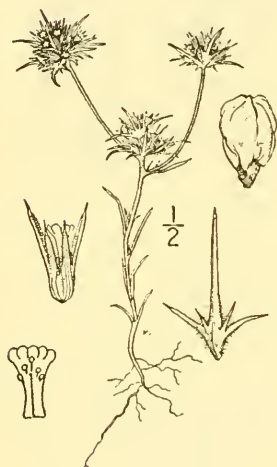
Plains of eastern Shasta County, south along the eastern borders of the Sacramento Valley and foothills of the Sierra Nevada to Mariposa County, California. Type locality: "California." June–July.



3990



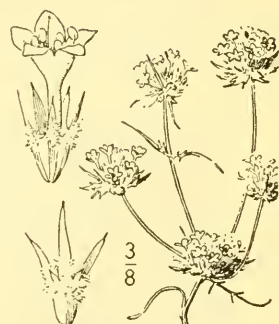
3991



3993



3994



3992



3996



3995

3990. *Navarretia mitracarpa*
 3991. *Navarretia pubescens*
 3992. *Navarretia prolifera*

3993. *Navarretia divaricata*
 3994. *Navarretia peninsularis*

3995. *Navarretia Breweri*
 3996. *Navarretia filicaulis*

24. *Navarretia atractyloides* (Benth.) Hook. & Arn. Holly-leaved Navarretia.
Fig. 3997.

Aegochloa atractyloides Benth. Bot. Reg. 19: under pl. 1622. 1833.

Navarretia atractyloides Hook. & Arn. Bot. Beechey 368. 1838.

Gilia atractyloides Steudel, Nom. 1: 684. 1840.

Navarretia hirsutissima Brand, Pflanzenreich 4²⁵⁰: 153. 1907.

Erect, often intricately branched annual, 5–20 cm. high, glandular-hirsute throughout. Leaves sessile, pinnately dissected from a broad, flat, linear or ovate rachis, lobes pungent, often proliferating from the base or branched above, terminal lobes usually 3, divaricately spreading; flowers capitate, the heads subtended by broad ovate, coriaceous, divaricately spinose bracts, flowers sessile in the axils of the bracts; calyx 5–7 mm. long, tube submembranous, growing with capsule, lobes entire or toothed or some entire and some toothed; corolla funnelform, 9–11 mm. long, tube 5–6 mm., throat 1.5–2 mm., lobes 2.5 mm. long, white, yellow, or blue; stamens unequally inserted, included, 1–1.5 mm. long; pistil 7 mm. long, included; capsule short-beaked by the persistent style-base, ovoid, 3–4 mm. long, dehiscent by valves; seeds reddish brown, irregularly angled, rugose-pitted.

Coast Ranges from Humboldt and Lake Counties, California, south to Lower California and insular California. Type locality: "California." Collected by Douglas. May–July.

25. *Navarretia hamata* Greene. Hooked Navarretia. Fig. 3998.

Navarretia hamata Greene, Pittonia 1: 139. 1887.

Navarretia macrantha Brand, Pflanzenreich 4²⁵⁰: 154. 1907.

Navarretia atractyloides var. *hamata* Jepson, Man. Fl. Pl. Calif. 791. 1925.

Gilia hamata Munz, Man. S. Calif. 400. 1935.

Annual, erect or diffusely branched from the base, 3–12 cm. high, glabrate to pilose-villous with weak white hairs. Leaves sessile with a broad clasping rigid rachis with 2–3 linear lobes on each side, the lowermost lobes often downwardly divergent, sometimes each bipartite from the base, terminal lobe usually divergently 3-forked; flowers in small heads subtended by broad, coriaceous, pinnate bracts with a thickened margin, lobes acicular, the terminal divergently 3-forked, sparingly villous; calyx 5–7 mm. long, the lobes unequal, pilose, sinus-membrane 2–3 mm. long; corolla funnelform with an ample throat, often bicolored, the tube light and the throat and lobes dark, tube 5.5 mm., throat 2.5 mm., lobes 4.5 mm. long, suborbicular; stamens equally inserted in throat, unequal in length, anthers exserted, about 1 mm. long; stigma-lobes about 0.75 mm. long; capsule tipped by the persistent style-base, 2–4 mm. long, locules several-seeded, seeds irregularly angled, reddish brown.

Southern San Luis Obispo County to Lower California and insular California. Type locality: "Guadalupe Mountain, Lower California." Collected by Orcutt. April–June.

Navarretia hamata subsp. *foliacea* (Greene) H. L. Mason. (*Navarretia foliacea* Greene, Pittonia 1: 138. 1887; *N. atractyloides* var. *foliacea* Jepson, Man. Fl. Pl. Calif. 791. 1925; *N. atractyloides* var. *flavida* Jepson, loc. cit.) Differing from the species in its less rigid, more herbaceous leaves. It may represent only a habitat modification. Ranging northward to San Luis Obispo County, California. Type locality: San Diego, California.

Navarretia hamata subsp. *leptantha* (Greene) H. L. Mason. (*Navarretia leptantha* Greene, Pittonia 1: 283. 1889.) Differing from the species in its long-exserted corolla-tube. Ranging north to San Diego, California. Type locality: All Saints Bay, Lower California.

26. *Navarretia heterodoxa* Greene. Calistoga Navarretia. Fig. 3999.

Gilia heterodoxa Greene, Bull. Calif. Acad. 1: 10. 1884.

Gilia viscidula var. *heterodoxa* A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 409. 1886.

Navarretia heterodoxa Greene, Pittonia 1: 134. 1887.

Gilia parvula Greene, Pittonia 1: 72. 1887.

Navarretia parvula Greene, Pittonia 1: 134. 1887.

Erect annual, 8–28 cm. high, stems brown or reddish brown, divaricately branched, minutely puberulent, glandular. Lower leaves slender, 1.8–4 cm. long, pinnate, with numerous short acerose lobes 1–3 mm. long, puberulent to glabrate, upper 6–17 mm. long, with 2–4 pairs of cuspidate teeth toward base, glandular-puberulent, rachis broad; flowers sessile in heads; bracts lanceolate to ovate with several cuspidate teeth at base, glandular-puberulent, usually bearing yellow globules of exudate; calyx 4.5–8 mm. long, cleft to base, sepals entire, acerose, glandular-pubescent, joined in lower 1.5–3 mm. by a sinus-membrane; corolla funnelform, 7.5–8.5 mm. long, blue, tube 3.5 mm. long, throat 2.5 mm., lobes 1.5 mm.; stamens inserted equally at base of throat, 6 mm. long, exserted; style exserted, stigma less than 0.5 mm. long; capsule ovoid, 3-celled, 2–3 mm. long; seeds brown, many in each locule.

Coast Ranges from Sonoma and Napa Counties south to Santa Clara County, California. Type locality: hills near Calistoga. June–July.

Navarretia heterodoxa subsp. *rosulata* (Brand) H. L. Mason. (*Navarretia rosulata* Brand, Pflanzenreich 4²⁵⁰: 154. 1907; *N. fallax* Brand, op. cit. 156.) Habit rosulate; stamens included, unequally inserted upon throat. Marin County, California. Type locality: San Anselmo, Marin County.

27. *Navarretia viscidula* Benth. Sticky Navarretia. Fig. 4000.

Navarretia viscidula Benth. Pl. Hartw. 324. 1844.

Gilia viscidula A. Gray, Proc. Amer. Acad. 8: 271. 1870.

Erect annual, 4–18 cm. high, stems white or purplish, glandular-pubescent, densely so above, simple or divaricately branched. Leaves narrowly linear, remotely pinnatifid, 10–45 mm. long,

sparsely pubescent to glabrate, upper leaves with lowermost lobes longest and least remote, becoming bracteate above; flowers sessile in heads at ends of branches; bracts 7–17 mm. long, glandular-pubescent dorsally, inner bracts expanded, becoming digitately lobed, middle lobe longest and pinnately toothed; calyx 5–9 mm. long, cleft to base, united below middle by sinus-membrane, glandular-pubescent; corolla funelform, 11–17.5 mm. long, tube 7–9 mm. long, throat 3–4 mm., lobes 4–6 mm., blue to purple, tube and throat lighter in color; stamens equal to unequal, 3–8 mm. long, inserted on lower half of throat, mostly exserted; pistil 14–16 mm. long; stigma 3-lobed, to 1 mm. long; capsule ovoid, 3–3.5 mm. long, 3-celled with 2–3 irregularly angled brown seeds in each cell.

Humboldt and Shasta Counties, south in the Coast Ranges to the San Francisco Bay region, California. Type locality: "In montibus Sacramento." Collected by Hartweg. June–July.

Navarretia viscidula subsp. *purpurea* (Greene) H. L. Mason. (*Navarretia purpurea* Greene ex Brand, Pflanzenreich 4250: 156. 1907; *N. viscidula* var. *purpurea* Jepson, Man. Fl. Calif. 792. 1925.) Differs from the typical species in the height of the plant, 2.5–14.5 cm.; the size of the corolla, 9.5–12 mm. with tube 4–5 mm., throat 2–3 mm., lobes 2.5–4 mm.; and in the stamens which are unequally inserted and 2–5 mm. long. Sierra Nevada foothills, Sutter County to Fresno County, California. Type locality: Middle Fork, Amador County, California.

28. *Navarretia squarrosa* (Eschsch.) Hook. & Arn. Skunkweed. Fig. 4001.

Hoitzia squarrosa Eschsch. Mém. Acad. St. Pétersb. 10: 283. 1826.

Gilia pungens Dougl. ex Hook. Bot. Mag. 57: pl. 2977. 1830.

Gilia squarrosa Hook. & Arn. Bot. Beechey 151. 1833.

Aegochloa pungens Benth. Bot. Reg. 19: under pl. 1622. 1833.

Navarretia pungens Hook. Fl. Bor. Amer. 2: 75. 1838.

Navarretia squarrosa Hook. & Arn. Bot. Beechey 368. 1838.

Navarretia pterosperma Eastw. Bot. Gaz. 37: 445. 1904.

Navarretia squarrosa var. *agrestis* Brand, Pflanzenreich 4250: 159. 1907.

Erect annual, 5–57 cm. high, with mephitic odor; stems green, purplish-tinged, branching simple, racemose or virgate, glandular-pubescent, viscid above. Leaves alternate, the lower pinnately filiform-dissected, 15–40 mm. long, glandular-pubescent, the upper pinnately to bipinnately unequally cleft, often the rachis broad with lobes proliferating from below, 10–17 mm. long, becoming bracteate above; bracts 10–18 mm. long, pinnately to palmately cleft, the lobes sometimes pinnate; flowers sessile in heads; sepals spatulate-attenuate, entire or toothed, subequal in length, 7–12 mm. long, united in lower half by sinus-membrane, glandular-pubescent; corolla broadly funnelform, 9–12 mm. long, blue to purple, tube 7–10 mm. long, throat indistinguishable from tube, lobes 2–3 mm. long; stamens equally to subequally inserted in lower half of tube, 1–4 mm. long, unequal to subequal, included; stigma included, 3-lobed, less than 0.5 mm. long; capsule ovoid, 3–4 mm. long, 3-celled, locules with numerous dark brown, irregularly shaped seeds.

West of the Cascades from Vancouver, British Columbia, south through Washington and Oregon, and in California through the Coast Ranges to Monterey County; foothills on west side of the Sierra Nevada to Amador County, California. Type locality: "in novae Californiae arenosis." June–Sept.

29. *Navarretia mellita* Greene. Honey-scented Navarretia. Fig. 4002.

Navarretia mellita Greene, Pittonia 1: 134. 1887.

Navarretia Eastwoodiae Brand, Pflanzenreich 4250: 157. 1907.

Erect annual, 3–20 cm. high, stems reddish, glandular-viscid, racemously or virgately branched, or branched from base. Leaves pinnately dissected and often with a few accessory lobes, rachis narrow, becoming broader above on the upper leaves, glandular-pilose to sparsely villous; inflorescence capitate; bracts palmately lobed or the broad middle lobe with a few teeth near the top, very glandular-viscid; calyx 6–9 mm. long, cleft to base, sepals unequal to subequal, entire, acerose, with or without a short intercostal membrane; corolla narrowly funnelform, lobes blue, the throat and tube lighter but with purple veins, 6–7 mm. long, the tube 1.5 mm., throat 3.5 mm., lobes 1.5 mm.; stamens equally inserted below middle of long tubular throat, filaments very short, included, anthers minute, white; stigma minute, 3-lobed, included; capsule 2.5 mm. long, ovoid, 3-celled, dehiscing along dorsal sutures from top downward, remaining attached at base; seeds several in each cell, dark brown, minutely pitted.

Coast Ranges, Humboldt County to San Luis Obispo County, California. Type-locality: Belmont, San Mateo County, California. May–July.

8. *LANGLOISIA* Greene, Pittonia 3: 30. 1896.

Low rigid diffusely branched desert annuals. Leaves alternate, linear to cuneate, pinnatifid-toothed with the lower divisions reduced to slender bristles, the upper bristle-tipped. Flowers in terminal few-flowered bracteate heads, the bracts foliaceous with bristle-tipped lobes or teeth. Calyx-lobes equal, spinescent-tipped, the tube scarious between the angles and splitting to the base, then appearing as 5 distinct sepals. Corolla showy, tubular-funnelform, more or less 2-lipped, with 3 lobes in the upper lip and 2 lobes in the lower, or sometimes nearly regular with the lips obscure. Stamens 5, inserted in the corolla-throat, exserted and often declined. Capsule regularly and often sharply 3-sided. Seeds 2–9 in the capsule, mucilaginous when wet. [Name in honor of Reverend Father Langlois of Louisiana.]

A genus of 5 species inhabiting the desert regions of western North America. Type species, *Navarretia Schottii* Torr.

Leaves abruptly dilated at apex, the bristles on the margin often 2-3-forked at base; corolla regular or nearly so; stamens shorter than the corolla-lobes.

Corolla-lobes not dotted, about one-third as long as the tube; calyx 6 mm. long.

1. *L. setosissima*.

Corolla-lobes purple-dotted, nearly as long as the tube; calyx 8-9 mm. long.

2. *L. punctata*.

Leaves pinnatifid, the rachis ligulate to spatulate, marginal bristles simple; corolla conspicuously bilabiate; stamens equaling or exceeding the corolla-lobes.

Corolla-lobes acute or acutish, one-half to one-third as long as the tube; calyx 3-4 mm. long.

3. *L. Schottii*.

Corolla-lobes truncate or nearly so and toothed at apex, almost as long as the tube; calyx 5-6 mm. long.

4. *L. Mattheusii*.

1. *Langloisia setosissima* (Torr. & Gray) Greene. Bristly Langloisia. Fig. 4003.

Navarretia setosissima Torr. & Gray ex Torr. Ives Rep. 22. 1860.

Gilia setosissima A. Gray, Proc. Amer. Acad. 8: 271. 1870.

Loeselia setosissima Peter in Engler & Prantl, Nat. Pflanzenf. 4^{3a}: 54. 1891.

Langloisia setosissima Greene, Pittonia 3: 30. 1896.

Langloisia setosissima var. *campylocladus* Brand, Pflanzenreich 4²⁶⁰: 171. 1907.

Low tufted annual 2-7 cm. high, or often with several prostrate branches up to 10 cm. long, glabrate or commonly tomentulose. Leaves 1-2 cm. long, the upper cuneate with 3 larger apical teeth and 1 or sometimes 2 pairs of lateral ones, abruptly narrowed into a winged petiole, the teeth and margins of the petiole with slender whitish bristles, often in pairs, basal leaves narrowly linear-subulate, little or not at all dilated at the apex; flowers usually crowded in terminal bracteate clusters; calyx about 6 mm. long; corolla bluish lavender, not spotted, almost regular, 12-16 mm. long, the lobes oblong-oval, obtuse or acutish and entire at apex, about one-third as long as tube; stamens shorter than the corolla-lobes.

Sandy or stony soils, especially in washes, Sonoran Zones; Malheur County, Oregon, and the desert regions of California from Inyo County to the southern boundary of the state, east to south Idaho, Utah, Nevada, and Arizona, and south to Lower California and Sonora. Type locality: Big Canyon, mouth of Diamond River, north-western Arizona. April-June.

2. *Langloisia punctata* (Coville) Goodding. Spotted Langloisia or Lilac Sunbonnet. Fig. 4004.

Gilia setosissima var. *punctata* Coville, Proc. Biol. Soc. Wash. 7: 72. 1892.

Navarretia setosissima var. *punctata* Coville, Contr. U.S. Nat. Herb. 4: 154. 1893.

Langloisia punctata Goodding, Bot. Gaz. 37: 58. 1904.

Langloisia lanata Brand, Pflanzenreich 4²⁶⁰: 169. 1907.

Stems simple to widely branched, 3-15 cm. high and in widely branched plants forming a low flat-topped tuft 15-20 cm. broad, thinly tomentulose to glabrate. Upper leaves with a deltoid 3-5-toothed apex, narrowed to a winged petiole bearing simple or 2-3-forked bristles on the narrow margins, the lower linear or not at all broadened at apex, finely bristle-toothed throughout; calyx 8-9 mm. long; corolla 15-20 mm. long, lilac, nearly regular, the lobes entire and obtuse at apex, purple-dotted and each with 2 low longitudinal channels ending at base in a low yellowish lanate ridge; anthers blue; capsule narrowly oblong, 3-sided, the angles acute.

Dry gravelly bajadas or mesas, Sonoran Zones; desert regions; White Mountains, Inyo County, south to Twenty-Nine Palms, Mojave Desert, California, eastward in scattered localities to western Nevada and western Arizona. Type locality: Surprise Canyon, Panamint Mountains, California. April-June.

3. *Langloisia Schottii* (Torr.) Greene. Schott's Langloisia. Fig. 4005.

Navarretia Schottii Torr. Bot. Mex. Bound. 145. 1859.

Gilia setosissima var. *exigua* A. Gray, Proc. Amer. Acad. 8: 271. 1870.

Gilia Schottii S. Wats. Bot. King Expl. 267. 1871.

Loeselia Schottii A. Gray, Bot. Calif. 2: 466. 1880.

Langloisia Schottii Greene, Pittonia 3: 30. 1896.

Low tufted annual 2-12 cm. high, main stem evident, erect and producing rather slender lateral branches throughout, or often branched at the base into several stout prostrate spreading branches, villous. Leaves linear to narrowly linear-oblongate, or the uppermost cuneately dilated at apex, 1-2.5 cm. long, sessile, pectinately pinnatifid, the teeth bristle-tipped or sometimes almost entirely reduced to bristles; calyx 3-4 mm. long, villous; corolla pale lavender or pink, rarely white or yellowish, 8-14 mm. long, upper lip 3-lobed with the lobes spreading and purple-spotted or sometimes with a larger arch-shaped spot; lower lip deeply 2-lobed, the lobes divergent, usually spotted at the base, one-half to one-third the length of the tube, linear to oblongate, acute; stamens declined, as long or longer than the corolla-lobes; capsule ovoid, 3-angled, 3-4 mm. long, 2-6-seeded.

Sandy washes and plains, Sonoran Zones; Mojave and Colorado Deserts, California, east to southern Utah and Arizona, south to northern Lower California and Sonora. Type locality: "Colorado Desert, Sonora." March-June.

Langloisia flaviflora Davidson, Bull. S. Calif. Acad. 21: 39. 1922. Leaves distinctly cuneately dilated and 3-toothed at apex; corolla yellow or sometimes white; stamens and styles usually not surpassing the corolla-lobes. Western Mojave Desert: Willow Springs, midway between Mojave and Cinco, one mile north of Ricardo, and Box S Ranch. Type locality: Willow Springs, Kern County, California. This is a little-known form, for the present probably best considered a variant of *Langloisia Schottii*.

4. *Langloisia Mattheusii* (A. Gray) Greene. Desert Calico. Fig. 4006.

Loeselia Mattheusii A. Gray, Bot. Calif. 2: 466. 1880.

Gilia Mattheusii A. Gray, Syn. Fl. N. Amer. ed. 2: 409. 1886.

Navarretia Mattheusii Coville, Contr. U.S. Nat. Herb. 4: 153. 1893.

Langloisia Mattheusii Greene, Pittonia 3: 30. 1896.

Stems simple and erect below, branched above or branched from the base forming tufts 2-30

cm. broad; stems whitish, thinly tomentulose. Leaves mostly broadly linear throughout, little or not at all broadened above, the margins toothed throughout with bristle-tipped teeth; flowers in terminal clusters; calyx 5–6 mm. long; corolla 2-lipped, white varying to pale blue or pink, the upper 3 lobes with a well-marked white and red pattern, the 2 lower unmarked or one of them sometimes slightly so, tube 8–10 mm. long, the lobes nearly as long, oblong, subentire to shallowly 3-toothed, retuse or sometimes rounded at apex; stamens and style exserted beyond the corolla-lobes.

Gravelly or sandy soils, Sonoran Zones; Inner Coast Ranges, Fresno County, and southern Sierra Nevada, Kern County, south to the desert slopes of the San Gabriel Mountains, east through Inyo County and Mojave Desert, California, to Nevada, Arizona, and Sonora. Type locality: Independence, Inyo County, California. March–June.

9. *LOESÈLIA* L. Sp. Pl. 628. 1753.

Low subshrub or herbaceous perennial, with a woody taproot, ours 10–40 cm. high. Leaves in ours alternate, linear, entire, or sometimes pinnately dissected into a few linear lobes. Flowers solitary in the upper axils or aggregated into glomerules at the ends of the upper branches. Flowers irregular. Corolla somewhat 2-lipped, stamens long-exserted, declined. Capsule cylindric, exceeding or subequaling the calyx. [Named in honor of Johannes Loeselius, Professor of Botany at Königsberg.]

A genus of about 16 species, natives of North and South America. Type species, *Loeselia ciliata* L.

1. *Loeselia tenuifolia* A. Gray. Narrow-leaved Loeselia. Fig. 4007.

Loeselia tenuifolia A. Gray, Proc. Amer. Acad. 11: 86. 1876.

Gilia tenuifolia A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 411. 1886.

Perennial with a woody taproot, stems much-branched from the base; plant 10–20 cm. high; herbage glabrous to sparingly pilose below, minutely glandular above. Leaves alternate, linear, entire or some pinnately dissected into few linear lobes; flowers solitary in the axils of the upper leaves; pedicels 2–10 mm. long, glandular; calyx cylindrical, glandular, membranous to the base below the sinuses, lobes linear, one-half as long as the tube; corolla red, 2–3 cm. long, 5 times the length of calyx, tubular-funnelform, the lobes unequal and unequally cleft (giving a bilabiate appearance), oblong-cuneate with a denticulate truncate apex; stamens unequal and unequally inserted on the tube of the corolla but equally exserted from it; style long-filiform, exserted, 3-cleft at the apex.

Desert slopes, Sonoran Zones; southeastern San Diego County, California, south to Lower California and east to Arizona and Mexico. Type locality: northern borders of Lower California, Tantillas Mountains, especially at the entrance of the Great Cañon. May–Oct.

10. *LEPTODÁCTYLON* Hook. & Arn. Bot. Beechey 369. 1838.

Shrubs or subshrubs of straggly or compact habit, 1–20 dm. high. Leaves opposite or alternate or sometimes differing on the lower and the upper part of the plant, digitately or pinnately parted into linear, pungently acicular lobes, usually glandular and rarely arachnoid-pubescent, usually with others densely fascicled in axils. Flowers congested in cymes or glomerules at the ends of the branches, rarely solitary in leaf-axils, sessile or subsessile. Calyx-lobes entire, equal or unequal, pungent, the sinuses about two-thirds filled with a membrane forming a pseudotube. Corolla salverform or narrowly funnel-form, usually conspicuous or showy, white to cream, yellow, lilac or pink, sometimes sordid, the tube and throat imperceptibly continuous or the throat very narrowly expanding; lobes rotate to subrotately spreading. Stamens inserted in the tube or on the throat, included, filaments subequaling anthers. Pistil included; stigma 3–4-lobed. Capsule subcylindric to cylindric, 3–4-celled; locules several to many-seeded. [Name Greek, meaning scales and fingers, in allusion to the shape of the leaves.]

A genus of about 6 species, native of western North America. Type species, *Leptodactylon californicum* Hook. & Arn.

Corolla salverform, tube equal or shorter than the lobes; stamens inserted on the corolla-tube; shrub 2–15 dm. high.

1. *L. californicum*.

Corolla narrowly funnelform, tube and throat longer than the lobes; stamens inserted high in throat; subshrub 1–5 dm. high.

Leaves unequally 3–5-digitate from the base, chiefly alternate, sometimes differing in position on the lower and upper parts of plant, flowers typically 5-merous; stigmas 3.

2. *L. pungens*.

Leaves digitate or pinnate from the top of a broad petiole, opposite; flowers typically 6-merous; stigmas 4.

3. *L. Jaegeri*.

1. *Leptodactylon californicum* Hook. & Arn. Prickly Phlox. Fig. 4008.

Leptodactylon californicum Hook. & Arn. Bot. Beechey 369. 1838.

Gilia californica Benth. in A. DC. Prod. 9: 316. 1845.

Navarretia californica Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Erect or decumbent evergreen shrub, sometimes quite straggly; stems 2–20 dm. high, branching from base or somewhat virgate, densely clothed with the current season's leaves as well as the dried leaves of one or more seasons back. Leaves evergreen, alternate to subopposite, palmately 3–9-cleft into unequal, linear, aciculate, pungent lobes with others densely fascicled in their axils; lobes 3–12 mm. long, tomentose to glandular-hirsute; flowers sessile, solitary in the upper

axils or in few-flowered cymes, 5- or sometimes 6-merous; calyx deeply cleft into subequal linear acerose lobes, sinuses one-half to two-thirds filled with a broad hyaline membrane forming a definite pseudotube; corolla salverform, pink, rarely white, tube and throat continuous, 10-15 mm. long, lobes twisted in bud, rotately spreading in anthesis, limb 20-30 mm. broad; stamens inserted near the middle of tube, filaments about 1 mm. long; stigma included; capsule ellipsoid, locules several-seeded.

Coastal mesas and canyons and in the chaparral, Upper Sonoran Zone; South Coast Ranges in California, from San Luis Obispo County to the Santa Monica Mountains. Type locality: California. Collected by Douglas, probably on his trip from Monterey to Santa Barbara. March-June.

Leptodactylon californicum subsp. *glandulosum* (Eastw.) H. L. Mason. (*Gilia californica* var. *glandulosa* Eastw. Bot. Gaz. 37: 447. 1904; *Leptodactylon californicum glandulosum* Abrams, Bull. N.Y. Bot. Gard. 6: 438. 1910; *L. californicum* f. *glandulosum* Wherry, Amer. Midl. Nat. 34: 383. 1945.) Herbage very pubescent; leaves often arachnoid-glandular. Mountains of southern California. Type locality: Pasadena, California.

2. *Leptodactylon pungens* (Torr.) Rydb. Granite Gilia. Fig. 4009.

Cantua pungens Torr. Ann. Lyc. N.Y. 2: 221. 1828.

Batanthes pungens Raf. Atl. Journ. 145. 1832.

Aegochloa Torreyi G. Don, Gen. Hist. Pl. 4: 246. 1838.

Gilia pungens Benth. in A. DC. Prod. 9: 316. 1845.

Navarretia pungens Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Leptodactylon pungens Rydb. Fl. Colo. 279. 1906.

Gilia pungens subsp. *eu-pungens* Brand, Pflanzenreich 4²⁵⁰: 126. 1907.

Leptodactylon Hazeliae M. E. Peck, Proc. Biol. Soc. Wash. 49: 111. 1936.

Leptodactylon pungens subsp. *eupungens* Wherry, Amer. Midl. Nat. 34: 383. 1945.

Leptodactylon pungens subsp. *Hookeri* f. *Hazeliae* Wherry, loc. cit.

Shrubs 1-8 dm. high, erect, spreading, internodes subequaling leaves, rarely longer, herbage densely glandular-villous. Leaves alternate, occasionally subopposite or sometimes the lower opposite, sessile, palmately cleft into 3-7 unequal, linear, pungent or rigidly acerose lobes with others fascicled in the axils; flowers sessile to subsessile in terminal or axillary glomerules or sometimes solitary in upper axils; calyx deeply cleft into unequal, linear, acerose lobes, sinuses about two-thirds filled with a hyaline membrane forming an evident pseudotube; corolla narrowly funnelform, 1-2 cm. long, white, yellow, lilac, or pink, often sordid and with a brownish purple pigment on back of lobes, throat very narrow, almost continuous with tube, lobes subrotately spreading, very sensitive to fluctuations in light intensity in opening and closing; stamens inserted on throat, included, filaments subequal to shorter than anthers, glabrous; pistil about one-third as long as corolla-tube; capsule cylindric, locules many-seeded.

Dry places and rocky ridges, Arid Transition Zone; British Columbia, Washington, and eastern Oregon, south through the Sierra Nevada to the mountains of Lower California, and east to the Rocky Mountains and New Mexico. The subspecies of *Leptodactylon pungens* are not too well defined. Type locality: "valley of the Loupe Fork," Nevada. May-Aug.

Leptodactylon pungens subsp. *pulchriflora* (Brand) H. L. Mason. (*Gilia pungens* var. *squarrosa* A. Gray, Proc. Amer. Acad. 8: 268. 1870; *Cantua pungens* var. *squarrosa* Howell, Fl. N.W. Amer. 453. 1901; *Leptodactylon lilacinum* Greene ex C. F. Baker, West. Amer. Pl. 1: 18. 1902. [Nomen nudum]; *L. patens* Heller, Muhlenbergia 1: 146. 1906; *G. pungens* subsp. *eu-pungens* var. *devestita* Brand, Pflanzenreich 4²⁵⁰: 128. 1907; *G. lilacina* Brand, loc. cit.; *G. pungens* subsp. *pulchriflora* Brand, Ann. Conserv. & Jard. Bot. Genève 15: 333. 1913; *L. pungens* var. *squarrosa* Tidestrom, Proc. Biol. Soc. Wash. 48: 42. 1935; *L. pungens* var. *subflavidum* Jepson, Fl. Calif. 3: 143. 1943; *L. lilacinum* f. *pulchriflorum* Wherry, Amer. Midl. Nat. 34: 384. 1945.) Lateral leaf-segments rarely less than half the length of the middle lobe, yet very unequal, often much branched; corolla-tube often long-exserted. By far the common subspecies in the Pacific States. Washington and Oregon and the mountains of western Great Basin through the Sierra Nevada to the mountains of southern California. Type locality: Farewell Gap, Tulare County, California.

Leptodactylon pungens subsp. *Hookeri* (Dougl.) Wherry, Amer. Midl. Nat. 34: 383. 1945. (*Phlox Hookeri* Dougl. ex Hook. Fl. Bor. Amer. 2: 73. 1838; *Gilia Hookeri* Benth. in A. DC. Prod. 9: 316. 1845; *Leptodactylon Hookeri* Nutt. Journ. Acad. Phila. 1: 157. 1848; *G. pungens* var. *Hookeri* A. Gray, Proc. Amer. Acad. 8: 268. 1870; *Cantua pungens* var. *Hookeri* Howell, Fl. N.W. Amer. 453. 1901; *G. pungens* subsp. *eu-pungens* var. *Hookeri* Brand, Pflanzenreich 4²⁵⁰: 126. 1907; *L. brevifolium* Rydb. Bull. Torrey Club 40: 474. 1913; *L. pungens* var. *Hookeri* Jepson, Man. Fl. Pl. Calif. 807. 1925; *L. pungens* var. *shastense* Jepson, Fl. Calif. 3: 143. 1943; *L. pungens* subsp. *brevifolium* Wherry, Amer. Midl. Nat. 34: 383. 1945; *L. lilacinum* f. *shastense* Wherry, op. cit. 384.) Leaves very short, often less than 5 mm., opposite in north of range, subopposite to alternate in south of range; stamens midway on throat; branching usually virgate. Eastern Washington southward to Arizona. Type locality: "near the narrows of the Oskangan and Priest's Rapid of the Columbia."

Leptodactylon pungens subsp. *Hallii* (Parish) H. L. Mason. (*Gilia Hallii* Parish, Erythraea 7: 94. 1899; *G. tenuiloba* Parish, op. cit. 95; *G. pungens* var. *Hallii* Milliken, Univ. Calif. Pub. Bot. 2: 42. 1904; *G. pungens* var. *tenuiloba* Milliken, op. cit. 43; *Leptodactylon Hallii* Heller, Muhlenbergia 1: 146. 1906; *L. tenuilobum* Heller, loc. cit.; *G. pungens* subsp. *eu-pungens* var. *tenuiloba* Brand, Pflanzenreich 4²⁵⁰: 128. 1907; *G. pungens* subsp. *Hallii* Brand, loc. cit.; *L. pungens* var. *tenuilobum* Jepson, Man. Fl. Pl. Calif. 807. 1925; *L. pungens* var. *Hallii*, loc. cit.) Middle leaf-segment divaricate, spinose, lateral segments rarely over one-third as long, occasionally quite obsolete; stems often virgate; texture of foliage quite variable. Eastern Washington and Idaho south through the Great Basin to the mountains of southern California. Type locality: Coyote Canyon, El Toro Mountain, Riverside County, California.

3. *Leptodactylon Jaegeri* (Munz) Wherry. San Jacinto Phlox. Fig. 4010.

Gilia Jaegeri Munz, Bull. S. Calif. Acad. 31: 68. 1932.

Leptodactylon pungens var. *Jaegeri* McMinn, Man. Calif. Shrubs 450. 1939.

Leptodactylon pungens Jepson, Fl. Calif. 3: 142, in part. 1943.

Leptodactylon Jaegeri Wherry, Amer. Midl. Nat. 34: 384. 1945.

Cespitose perennials with woody base, 3-10 cm. high. Leaves chiefly opposite, simple or 3-cleft into linear, flat, strongly venose lobes from the end of a conspicuous petiole; flowers solitary in the upper leaf-axils; calyx narrowly cylindric, 8-10 mm. long; sepals 6, subequal, sinuses of the lobes nearly filled with a narrow hyaline membrane; corolla funnelform, 25-30 mm. long with 6 (rarely 5) petals, tube 2 times the calyx; stamens 6, inserted on base of throat,

filaments subequaling anthers; pistil of 4 carpels, stigma 4-lobed, included; capsule 4-valved, campanulately spreading on dehiscence. A remarkable species closely related to *Leptodactylon Watsonii* A. Gray of the Rocky Mountains region.

Dry rocky places, Canadian Zone; known only from a few localities in the San Jacinto Mountains, California. Type locality: Tahquitz Peak, San Jacinto Mountains. May-July.

11. GÍLIA Ruiz & Pav. Fl. Peruv. Prod. 25. 1794.*

Annual, biennial or perennial herbs. Leaves alternate, entire or variously lobed and dissected, often disposed in a basal rosette. Flower solitary on slender pedicels in the leaf axils or in paniculately branched or thyrsoid inflorescences or congested in glomerules or sessile in capitate heads. Calyx-lobes usually equal, cleft nearly to the base and often flanked on the margins by a membrane, that of adjoining sepals often uniting to form a pseudotube which becomes distended or ruptured by the growing capsule. Corolla funnel-form to salverform, usually regular, blue, pink, red, yellow, or white. Stamens inserted on the corolla-tube or the throat, often in the sinuses of the corolla-lobes, usually equal, sometimes unequally inserted and unequal in length. Capsule 3-celled, the valves remaining joined at the base and campanulately spreading on dehiscence. Seeds usually several to many in a locule, rarely 1 or 2. [Named in honor of Filipe Luis Gil, a Spanish botanist.]

A New World genus of about 40 species, most highly developed in California. Type species, *Gilia laciniata* Ruiz & Pav.

Plants perennial or biennial (see also *G. Ripleyi*).

Corolla red, rarely pink or yellow, 20–30 mm. long; inflorescence a thyrsoid panicle.

1. *G. aggregata*.

Corolla white, 6–10 mm. long; inflorescence capitate congested.

2. *G. congesta*.

Plants annual (except *G. Ripleyi*).

Flowers in leafy-bracted glomerules at the ends of long naked branches, sometimes the lower solitary in the axils; plants spreading or prostrate.

Leaves pinnatifid; flowers all in terminal clusters.

3. *G. polycladon*.

Leaves entire or irregularly toothed; the lower flowers solitary in the leaf-axils.

4. *G. depressa*.

Flowers in panicles or heads or solitary in the axils of the leaves.

Corolla funnelliform or salverform.

Flowers usually in well-differentiated inflorescences, usually not scattered and not solitary in the leaf-axils, although sometimes the inflorescence leafy-bracted.

Ovules solitary in the locules, rarely 2 to a locule; stamens unequally inserted on a long narrow throat.

5. *G. gilioides*.

Ovules several to many in each locule; stamens equally inserted on the tube or throat or in the sinuses of the corolla-lobes.

Leaf-blades ovate or elliptic, the teeth aristate.

Plant annual, corolla pink within, buff or white exteriorly.

6. *G. latifolia*.

Plant perennial, corolla pink both within and without.

7. *G. Ripleyi*.

Leaf-blades variously pinnately lobed and dissected or cleft.

Stems leafy, the cauline leaves becoming reduced only toward the apex; basal rosette of leaves present or absent; flowers sessile to subsessile in capitate heads or in few-flowered glomerules, sometimes solitary on slender pedicels.

Corolla-lobes linear, rarely exceeding 1.5 mm. in width; flowers 6–8 mm. long, sessile in dense, capitate inflorescences.

8. *G. capitata*.

Corolla-lobes oval, broader than 2 mm.; flowers 5–19 mm. long, sessile or subsessile in capitate inflorescences or in few-flowered glomerules, sometimes solitary on slender pedicels.

Membrane of pseudotube usually colorless, broader than calyx-lobes; corolla pale violet to deep blue-violet throughout; inflorescence 5–50-flowered, rarely fewer; calyx-lobes acuminate, recurved in flower.

9. *G. achilleaeifolia*.

Membrane of pseudotube always purple, narrower than calyx-lobes; corolla blue to violet, with yellow tube and base of throat, and often 5 irregular purple spots in upper throat; inflorescence 1–5-flowered; calyx-lobes acute, erect, not recurved in flower.

Corolla 5–13 mm. long, just exceeding to 2 times as long as calyx; throat narrow, yellow or often bearing 5 purple spots.

10. *G. multicaulis*.

Corolla 10–19 mm. long, at least twice as long as calyx; throat broadly expanded, always bearing 5 purple spots or a purple ring.

11. *G. tricolor*.

Stems usually not conspicuously leafy; cauline leaves much shorter than the basal; basal rosette of leaves prominent; flowers long- or short-pedicellate, in few- to many-flowered panicles.

Basal leaves soft-pubescent with fine curled hairs or glabrous.

Cauline and basal leaves with slender rachis and narrowly linear lobes which are 2 to several times as long as the rachis is broad, or the basal leaves simple, pinnately toothed or occasionally bipinnate, the lobes linear.

Calyx longer than corolla-tube, and at least one-half as long as corolla.

12. *G. ochroleuca*.

Calyx exceeded by corolla-tube, and less than one-half as long as corolla.

Inflorescence open-paniculate, the branches widely divaricate; corolla-throat abruptly expanded and full; corolla-tube pale violet or yellowish.

13. *G. Abramsii*.

* Text contributed by Herbert Louis Mason and Alva Day Grant.

Inflorescence paniculate-subglomerate or loose-paniculate with the branches tending to be virgate; corolla-tube deep blue or purple, sometimes yellow-striated dorsally.

14. *G. tenuiflora*.

Cauline leaves with medium to broad rachis, the lobes or teeth various but not linear, and if leaves are simple-pinnate the lobes or teeth usually shorter than the width of the rachis (a complex intergrading series).

Largest corollas 15–56 mm. long.

Inflorescence subglomerate or narrowly open-paniculate, never corymbose-paniculate.

Corolla-tube less than twice the throat.

15. *G. latiflora*.

Corolla-tube 2 or more times the throat.

Pubescence of leaves densely tufted, like a mass of gray wool; east slope of the Sierra Nevada in Inyo and Mono Counties, California.

15a. *G. latiflora cana*.

Pubescence of basal leaves moderately woolly pubescent, not densely woolly-tufted.

Inflorescence subglomerate; branches and pedicels stout; corolla 20–56 mm. long, with tube 0.8–1.9 mm. broad and lobes 3.7–10 mm. broad; northern Mojave Desert in Kern and north-western San Bernardino Counties, California.

15b. *G. latiflora speciosa*.

Inflorescence loose-paniculate not subglomerate, the branches slender, virgate; corolla 12–25 mm. long with tube 0.5–0.7 mm. broad and lobes 2–3.9 mm. broad; southern Sierra Nevada in Tulare County.

15c. *G. latiflora Purpusii*.

Inflorescence corymbose-paniculate, often very much branched.

15d. *G. latiflora triceps*.

Largest corollas 5–14 mm. long (sometimes longer in *G. latiflora leptantha*).

Stamens unequal, one or more longer than corolla-lobes.

15e. *G. latiflora leptantha*.

Stamens equal or subequal, all shorter than the corolla-lobes.

Corolla-tube shorter than corolla-throat.

15f. *G. latiflora exilis*.

Corolla-tube longer than corolla-throat.

16. *G. sinuata*.

Basal leaves coarsely pubescent either with white geniculate hairs, translucent straight hairs, or short gland-tipped hairs, never glabrous or woolly.

Basal leaves coarsely pubescent with white geniculate hairs or translucent straight hairs, bi- to tripinnately lobed or toothed with slender rachis, or leaves broad and irregularly cleft.

Calyx well-exceeded by mature capsule, glabrous, or occasionally very lightly glandular-dotted; capsule oblong; uppermost cauline leaves usually entire.

Stamens less than 3 mm. long, shorter than the corolla-lobes; corolla 14–37 mm. long (except in subsp. *australis*).

17. *G. splendens*.

Stamens 3–5.5 mm. long, longer than the corolla-lobes; corolla 7.5–12.5 mm. long.

18. *G. caruifolia*.

Calyx accrescent, subequal to or exceeding the mature capsule, densely glandular-dotted; capsule broadly ovoid; uppermost leaves toothed or lobed, not entire.

Corolla-tube included in calyx, and from shorter than to less than twice as long as throat; pubescence of lower leaves consisting of white, geniculate hairs.

19. *G. stellata*.

Corolla-tube elongate, much exceeding calyx and more than twice as long as throat; pubescence of lower leaves consisting of straight (not geniculate), translucent hairs.

20. *G. scopulorum*.

Basal leaves pubescent with short, gland-tipped hairs, shallowly sinuate-toothed, or short-lobed, the teeth acuminate or apiculate and tipped with a sharp cusp; in the subspecies the lobes more deeply cut, rounded and often with short secondary lobes.

21. *G. leptomeria*.

Flowers usually solitary in the leaf-axils; leaves typically entire or filiform, sometimes the lower pinnately dissected into filiform segments.

Stamens unequally inserted on the corolla throat; corolla-lobes a rich pink or rose; corolla 7–20 mm. long.

22. *G. leptalea*.

Stamens equally inserted; corolla-lobes pale pink, white or light blue.

Ovules 1 to each locule; stamens inserted on corolla-tube.

23. *G. minutiflora*.

Ovules several to each locule, stamens inserted in sinuses of corolla-lobes.

24. *G. capillaris*.

Corolla campanulate or turbinate; flowers usually solitary in the leaf-axils or on the stem opposite a leaf.

Corolla 1–2 mm. long or less, barely exserted from the calyx, usually turbinate.

25. *G. tenerrima*.

Corolla 2–5 mm. long, 2 or more times the calyx.

Corolla golden yellow; leaves linear-filiform.

26. *G. filiformis*.

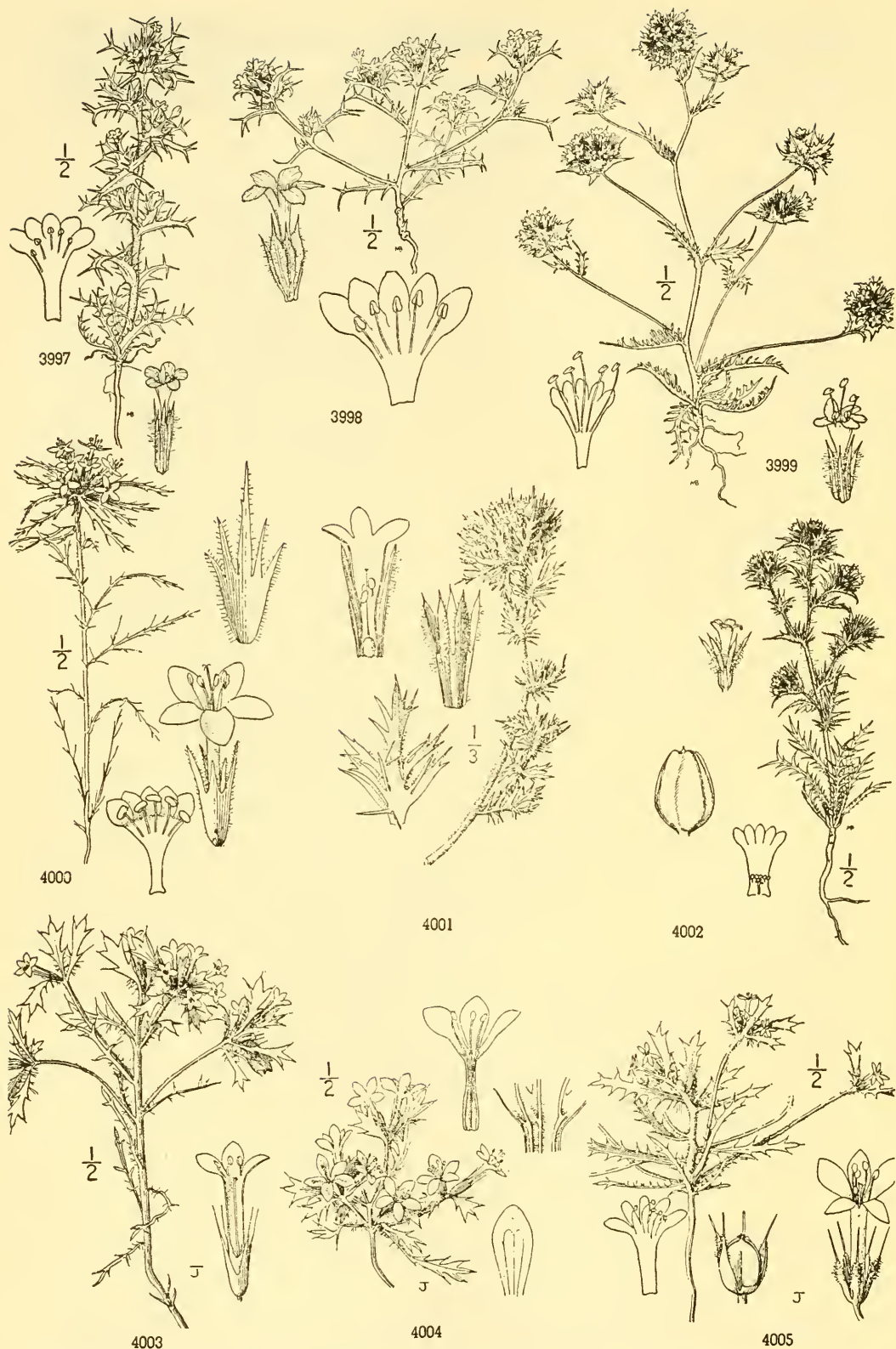
Corolla white or cream, the throat yellow; leaves, at least the lower, ovate to ovate-lanceolate.

Corolla-tube and throat shorter than the calyx as well as shorter than corolla-lobes; stamens equal.

27. *G. inyoensis*.

Corolla-tube and throat longer than the calyx and longer than the corolla-lobes; stamens unequal.

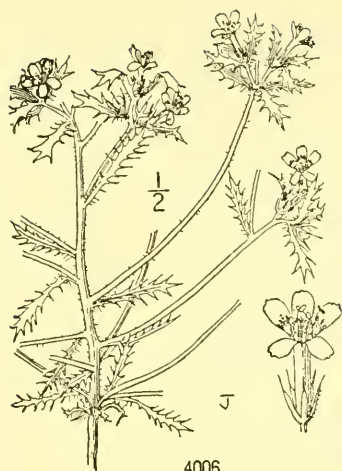
28. *G. campanulata*.



3997. *Navarretia atractyloides*
 3998. *Navarretia hamata*
 3999. *Navarretia heterodoxa*

4000. *Navarretia viscidula*
 4001. *Navarretia squarrosa*
 4002. *Navarretia mellita*

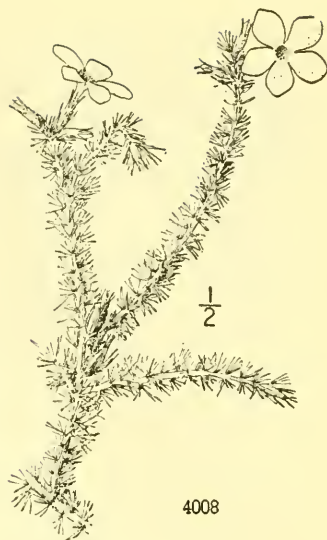
4003. *Langloisia setosissima*
 4004. *Langloisia punctata*
 4005. *Langloisia Schottii*



4006



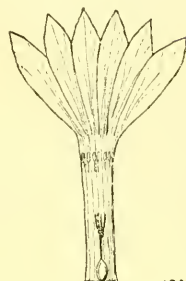
4007



4008



4009



4010



4011



4012

4006. *Langloisia Matthewsii*

4007. *Loeselia tenuifolia*

4008. *Leptodactylon californicum*

4009. *Leptodactylon pungens*

4010. *Leptodactylon Jaegeri*

4011. *Gilia aggregata*

4012. *Gilia congesta*

1. *Gilia aggregata* (Pursh) Spreng. Scarlet *Gilia*. Fig. 4011.

- Cantua aggregata* Pursh, Fl. Amer. Sept. 1: 147. 1814.
Ipomeria aggregata Nutt. Gen. 1: 124. 1818.
Gilia aggregata Spreng. Syst. 1: 626. 1825.
Gilia pulchella Dougl. in Lindl. Bot. Reg. 15: pl. 1281, as a synonym. 1829.
Batanthes aggregata Raf. Atl. Journ. 145. 1832.
Gilia aggregata var. *Bridgesii* A. Gray, Proc. Amer. Acad. 8: 276. 1870.
Collomia aggregata T. C. Porter in A. Gray, Syn. Fl. N. Amer. 2: 394. 1878.
Navarretia aggregata Kuntze, Rev. Gen. Pl. 2: 433. 1891.
Callisteris aggregata Greene, Leaflets Bot. Obs. 1: 159. 1905.
Callisteris Bridgesii Greene, op. cit. 160.
Callisteris pulchella Greene, loc. cit.
Batanthes Bridgesii Greene, op. cit. 224.
Batanthes pulchella Greene, loc. cit.
Gilia aggregata subsp. *Bridgesii* Brand, Pflanzenreich 4250: 116. 1907.
Gilia aggregata subsp. *eu-aggregata* Brand, op. cit. 115.
Gilia aggregata subsp. *eu-aggregata* var. *typica* Brand, loc. cit.
Gilia aggregata f. *aurea* Macbride & Payson, Contr. Gray Herb. No. 49: 64. 1917.
Gilia aggregata subsp. *formosissima* f. *aurea* Wherry, Bull. Torrey Club 73: 196. 1946.
Gilia Bridgesii Wherry, op. cit. 197.

Biennial, 1–5 dm. high, simple or branched from the base, glandular-puberulent to pilose. Leaves pinnately dissected, 3–5 cm. long, the lobes 1–2 cm. long, midrib often villous; inflorescence a thyrsoid panicle; sepals linear-attenuate to rarely triangular, flanked below by a membrane which unites to form a pseudotube; corolla tubular-funnelform 2–5 cm. long, red (to golden yellow) or pink, often spotted with yellow, rarely white; lobes lanceolate, rotately spreading, often becoming reflexed; stamens equally or unequally inserted in or below the corolla-sinuses and barely exerted from throat, filaments 1–2 mm. long; capsule ovoid, subequaling calyx; seeds many in each locule.

Open woods, Transition Zone; North Coast Ranges, Sierra Nevada, and Panamint Mountains, California, north to British Columbia, east to Rocky Mountains. Type locality: Hungry Creek, Idaho. Collected by Lewis. June–Sept.

2. *Gilia congesta* Hook. Many-flowered *Gilia*. Fig. 4012.

- Gilia congesta* Hook. Fl. Bor. Amer. 2: 75. 1838.
Gilia iberidifolia Hook. Kew Journ. Bot. 3: 290. 1851.
Gilia congesta var. *paniculata* M. E. Jones, Proc. Calif. Acad. II. 5: 712. 1895.
Gilia montana Nels. & Kenn. Proc. Biol. Soc. Wash. 19: 37. 1906.
Gilia congesta subsp. *iberidifolia* Brand, Pflanzenreich 4250: 121. 1907.
Gilia congesta subsp. *palmifrons* Brand, op. cit. 122.
Gilia palmifrons Rydb. Bull. Torrey Club 40: 470. 1913.
Gilia nevadensis Tidestrom, Proc. Biol. Soc. Wash. 38: 15. 1925.
Gilia congesta var. *montana* Constance & Rollins, Amer. Journ. Bot. 23: 439. 1936.

Erect or spreading perennial, stems ascending from a persistent basal tuft, pubescence arachnoid-floccose. Leaves pinnately or bipinnately lobed from a broad petiole, or laciniate, 1–4 cm. long, becoming reduced and pseudopalmate in the inflorescence, often floccose beneath and glabrate above; flowers sessile in capitate heads, or rarely in smaller aggregated heads at ends of branches; calyx cylindric, the lobes flanked by a membrane which unites below to form a membranous pseudotube, densely arachnoid; corolla salverform, 4–6 mm. long, white; tube 3–4 mm. long, yellow, lobes 2 mm. long; stamens inserted on the short throat and exerted therefrom; pistil exerted; capsule obovoid; seeds 1 or 2 to a locule.

Transition and Hudsonian Zones; Washington, Oregon, south through the Sierra Nevada, California, east to Nebraska. Type locality: sandy plains of the Columbia. June–Sept.

3. *Gilia polycladon* Torr. Spreading *Gilia*. Fig. 4013.

- Gilia polycladon* Torr. Bot. Mex. Bound. 146. 1858.

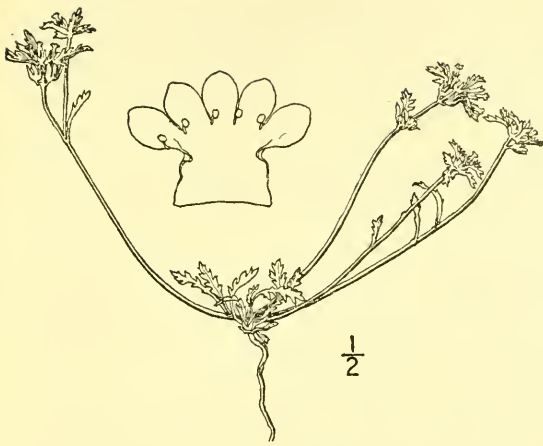
Erect, spreading, or prostrate annual, 5–15 cm. high, stems several from the base, often with long, naked internodes, glandular-puberulent. Basal leaves in a loose rosette, pinnately dissected, with a long petiole, pilose below, glabrous above; inflorescence congested in leafy-bracted heads; bracts entire to pinnately dissected; calyx cleft into oblong linear lobes, each with a rigid spine, pilose within, glabrous externally, flanked by a membranous margin which unite below to form a pseudotube; corolla tubular-funnelform, barely exceeding calyx, white to rose, 4–6 mm. long, tube 4 mm. long, throat 0.5–1 mm. long, lobes 1 mm. long; stamens inserted in sinuses of corolla-lobes; capsule ellipsoidal; seeds 2 to each locule.

Gravelly slopes, Sonoran Zones; eastern Mojave Desert to central Nevada and Oregon, south to Texas and Mexico. Type locality: stony hills near El Paso, Texas. May–June.

4. *Gilia depréssa* M. E. Jones. Argus *Gilia*. Fig. 4014.

- Gilia depréssa* M. E. Jones ex A. Gray, Proc. Amer. Acad. 16: 106. 1880.
Navarretia depréssa Kuntze, Rev. Gen. Pl. 2: 433. 1891.
Microsteris depréssa Davids. & Moxley, Fl. S. Calif. 287. 1923.

Divaricately branched annual, 2–10 cm. high, coarsely pilose. Leaves linear to lanceolate-



4013



4014



4015



4016

4013. *Gilia polycladon*
4014. *Gilia depressa*

4015. *Gilia gilioides*

4016. *Gilia latifolia*

elliptic, entire or with a few teeth; flowers solitary or congested in few-flowered leafy glomerules at ends of branches; sepals acicular flanked by a membrane which unites to form a long pseudotube; corolla salverform to slightly irregular, white, the throat yellow, often speckled, tube 3–4 mm. long, lobes 1 mm. long; stamens inserted on tube, exerted, pistil included; capsule ellipsoidal, subequal calyx; seeds 4 to 5 in each locule.

Sonoran Zones; eastern Mojave Desert, California, east to Utah and Nevada. Type locality: Riverside, Utah. April–May.

5. *Gilia gilioïdes* (Benth.) Greene. Straggling *Gilia*. Fig. 4015.

Collomia gilioïdes Benth. Bot. Reg. 19: under pl. 1622. 1833.

Gilia divaricata Nutt. Journ. Acad. Phila. 1: 155. 1848.

Gilia gilioïdes Greene, Erythea 1: 93. 1893.

Gilia violacea Heller, Muhlenbergia 1: 56. 1904.

Gilia gilioïdes var. *integrifolia* Brand, Pflanzenreich 4²⁵⁰: 93. 1907.

Gilia gilioïdes var. *Greeneana* Brand, loc. cit.

Gilia gilioïdes var. *Benthamiana* Brand, loc. cit.

Microsteris gilioïdes var. *Benthamiana* Davids. & Moxley, Fl. S. Calif. 287. 1923.

Gilia modocensis Eastw. Leaflets West. Bot. 2: 283. 1940.

Gilia gilioïdes var. *ianthina* Jepson & Hoover in Jepson, Fl. Calif. 3: 197. 1943.

Erect or decumbent annuals, often very much branched, sometimes simple, villous to glandular viscid. Lower leaves 2–7 cm. long, pinnately 3–9 lobed, the lobes narrowly lanceolate, entire or irregularly toothed, sometimes in a basal tuft; cauline leaves pinnately 3–5-lobed, the terminal elongate, the lobes lanceolate, entire or irregularly toothed; inflorescence of glomerules, each 2–6-flowered, either terminal or on short lateral branchlets; pedicels 2–5 mm. long often elongating with the growing capsule; calyx 3–4 mm. long, lobes linear acuminate, the membranous pseudotube about one-half the calyx length; corolla 5–10 mm. long, about 2 times the calyx, the tube and throat continuous, 2–4 times the lobes, 6 mm. long and the lobes 2–2.5 mm. long, violet to purple or white; stamens unequally inserted on the upper half of throat, 0.5–2 mm. long, included; capsule 3–4 mm. long, locules usually 1-seeded, rarely 2-seeded.

Mountains and valleys, Sonoran Zones to Canadian Zone; California, east into Nevada and north in Oregon. Type locality: "California." Collected by Douglas. April–July.

Gilia gilioïdes subsp. *glutinosa* (Benth.) Mason & Grant, Madroño 9: 207. 1948. (*Collomia glutinosa* Benth. Bot. Reg. 19: under pl. 1622. 1833; *Gilia glutinosa* A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 408. 1886; *G. gilioïdes* var. *glutinosa* A. Gray, Proc. Amer. Acad. 8: 260. 1870; *G. Traskiae* Eastw. ex Milliken, Univ. Calif. Pub. Bot. 2: 26. 1904; *Microsteris Traskiae* Davids. & Moxley, Fl. S. Calif. 287. 1923; *G. gilioïdes* var. *glutinosa* Jepson, Man. Fl. Pl. Calif. 797. 1925.) Stamens conspicuously exerted. Southern and insular California to Lower California. Type locality: "California." Collected by Douglas.

Gilia gilioïdes subsp. *volcánica* (Brand) Mason & Grant, loc. cit. (*Gilia divaricata* var. *volcanica* Brand, Pflanzenreich 4²⁵⁰: 94. 1907; *G. gilioïdes* var. *volcanica* Jepson & Hoover in Jepson, Fl. Calif. 3: 197. 1943.) Corolla 12–22 mm. long, tube 9–16 mm., throat deep red-violet, lobe 3–6 mm., pale pink; stamens unequal, the shortest 1.5–2 mm. long, the longest 4–6.5 mm., unequally inserted in upper one-third or one-fourth of tube, the longest exerted. Coast Ranges, Lake County to Contra Costa County; western slope of Sierra Nevada from El Dorado County to Tuolumne County, California. Type locality: Santa Lucia Mountains.

6. *Gilia latifolia* S. Wats. Broad-leaved *Gilia*. Fig. 4016.

Gilia latifolia S. Wats. Amer. Nat. 9: 347. 1875.

Navarretia latifolia Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Erect annual 5–20 cm. high, simple or much-branched. Leaves simple or pinnately lobed with broad blade, teeth deltoid, rarely long-aristate, 5–12 cm. long, 1–5 cm. wide; petioles 1–5 cm. long, glandular-pilose to viscid or glabrate; inflorescence open-paniculate to somewhat glomerate; bracts simple, linear to oblong and toothed or pinnately lobed or foliaceous; sepals linear-lanceolate, flanked on lower one-third to one-half by a sinus-membrane which is joined to form a pseudotube; corolla narrow-funnelform, 6–11 mm. long, bright pink within, pale or buff outside, vespertine; stamens included, subequally inserted on the middle of the corolla-tube, unequal, filaments stout; pistil included, stigma 3-lobed; capsule ovoid to cylindric, 5–7 mm. long; seeds deep reddish-brown, numerous.

Lower Sonoran Zone; Mojave and Colorado Deserts from San Diego County to Inyo County, California, east to Nevada and Utah. Type locality: Virgin River Valley, Utah. March–May.

7. *Gilia Ripleyi* Barneby. Ripley's *Gilia*. Fig. 4017.

Gilia Ripleyi Barneby, Leaflets West. Bot. 3: 129. 1942.

Gilia Gilmanii Jepson, Fl. Calif. 3: 192. 1943.

Perennial subshrub, branching from the base, glutinous with capitate hairs. Leaves iliciform, usually simple with a broad obovate blade and long aristate teeth, 2–6 cm. long, 1–4 cm. broad, petioles 5–20 mm. long, glandular-pilose, withering-persistent; inflorescence cymose-paniculate; bracts linear to 3-lobed; pedicels divaricately spreading; calyx 4–5 mm. long, sepals aristiform, sinus-membrane on lower half joined to form a pseudotube; corolla vespertine, 5–7 mm. long, lobes elliptical, 2–3 mm. long, uniformly pink within and without, tube white, throat narrow; stamens unequal, inserted subequally on lower part of tube, included; filaments stout, very unequal; pistil included, style squamellate-pubescent, barely lobed; capsule ellipsoidal, 4–5 mm. long, included in calyx; seeds deep reddish brown, small and numerous in each locule.

Crevices in calcareous rock, Lower Sonoran Zone; Panamint Mountains, California, to the Sheep Mountains, Nevada. Type locality: Specter Range, Nye County, Nevada. May.

8. *Gilia capitata* Sims. Blue Field Gilia. Fig. 4018.

Gilia capitata Sims, Bot. Mag. 53: pl. 2698. 1826.

Gilia capitata alba Orcutt, W. Amer. Sci. 7: 132. 1891.

Gilia pallida Heller, Muhlenbergia 1: 43. 1904.

Gilia glandulifera Heller, op. cit. 2: 114. 1906.

Gilia tenuisecta Heller, op. cit. 115.

Gilia dissecta Heller ex Brand, Pflanzenreich 4250: 111, as a synonym. 1907.

Gilia capitata var. *trisperma* Brandg. ex Brand, op. cit. 112.

Gilia capitata var. *glandulifera* Brand, Ann. Conserv. & Jard. Bot. Genève 15-16: 331. 1913.

Erect annual 1.5-6 dm. tall, glabrous or sparsely pubescent, simple, racemously or paniculately branched. Lower leaves simple-pinnate or bipinnate, 1-6 cm. long, often in a basal rosette, lobes 5-12 mm. long, equal to or broader than rachis, glabrous or pubescent; cauline leaves shorter or longer than basal leaves, 2-8.5 cm. long, simple-pinnate or bipinnate with lobes 8-12 mm. long; uppermost leaves simple-pinnate, reduced to 3-5 short segments; flowers sessile in dense, globose, capitate heads at ends of peduncles 5-7.5 cm. long; calyx glabrous, puberulent or arachnoid-villous, 3-4 mm. long, cleft to base, but joined below middle by sinus-membrane; corolla 6-8 mm. long, about 2 times as long as calyx, pale violet, often fading white; tube 2.5-3.5 mm. long, throat 0.5-2 mm., always shorter than tube, lobes 2-4 mm., linear; stamens inserted in sinuses of corolla-lobes, equal in length and equal to or longer than corolla-lobes; style shorter to longer than corolla; stigma to 0.5 mm.; capsule plump, ovoid, 3-4 mm. long, dehiscing by splitting of dorsal sutures from top downward, valves not recurving; seeds brown, several to a cell.

Sandy or gravelly areas, Upper Sonoran and Transition Zones; Vancouver, British Columbia, south through the Coast Ranges to Marin and Contra Costa Counties, California, inland through Shasta County and south through middle altitudes and foothills on west slope of the Sierra Nevada to Tulare County, California; Inner Coast Ranges in Fresno County. Type locality: Fort Vancouver. Collected by Douglas. March-May.

9. *Gilia achilleaeifolia* Benth. California Gilia. Fig. 4019.

Gilia achilleaeifolia Benth. Bot. Reg. 19: under pl. 1622. 1833.

Gilia achilleaeifolia Lindl. Bot. Reg. 20: pl. 1682. 1834.

Gilia stricta Scheele, Linnaea 21: 755. 1848.

Gilia achilleaeifolia var. *alba* Orcutt, W. Amer. Sci. 7: 132. 1891.

Gilia abrotanifolia Nutt. ex Greene, Erythea 3: 104. 1895.

Gilia multicaulis var. *eximia* Millikin, Univ. Calif. Pub. Bot. 2: 35. 1904.

Gilia multicaulis subsp. *eu-multicaulis* var. *stricta* Brand, Pflanzenreich 4250: 110. 1907.

Gilia multicaulis subsp. *eximia* Brand, loc. cit.

Gilia achilleaeifolia subsp. *abrotanifolia* Brand, op. cit. 111.

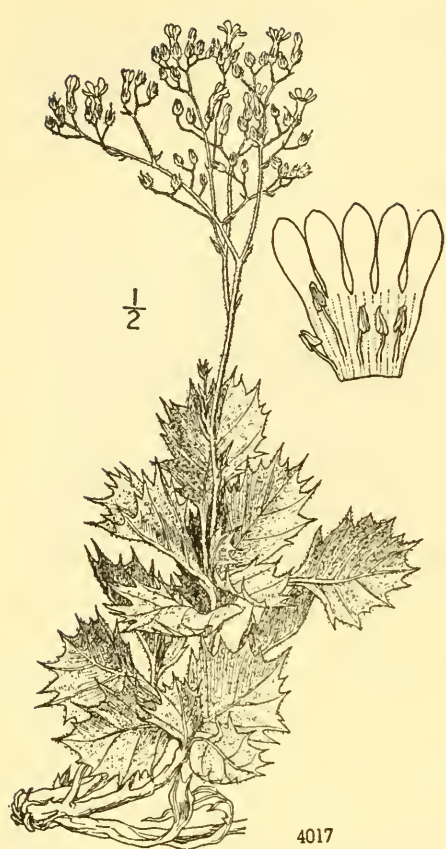
Erect annual 1-10 dm. tall, stems branching from near base or above, glabrous or villous or glandular. Lower leaves 2-11 cm. long, often forming basal rosette, bipinnate or occasionally simple-pinnate or tripinnate, the lobes linear, 3-15 mm. long, equal in width to rachis, glabrous or, especially the rachis, villous; inflorescence a capitate, congested panicle consisting of 5-25 or more, rarely fewer, flowers on short pedicels, outline fan-shaped to round, depending upon number of flowers and length of pedicels; pedicels glabrous, stipitate-glandular or with same pubescence as the calyx; calyx 4-7 mm. long, glabrous or cobwebby-villous or with coarse translucent or glandular hairs, the lobes very narrow, acuminate, and often recurved at tips, joined in lower two-thirds by a broad, hyaline membrane which is occasionally tinged with purple; corolla broadly funnelform, 8-16.5 mm. long, 2-3 times as long as calyx, violet or blue-violet, tube 2.5-5 mm. long, throat 3.5-5.5 mm., usually exceeding tube, lobes 2-6 mm. long, oval; stamens inserted in sinuses of corolla-lobes, and subequal to or shorter than corolla-lobes; pistil included or exerted, the stigma 1-2.5 mm. long; capsule ovoid, 4-6.5 mm. long, 3-celled with numerous, irregularly angled, brown seeds in each.

Sandy or gravelly areas, Upper Sonoran and Transition Zones; Contra Costa and Alameda Counties, California, south in the Coast Ranges to San Diego County, California, and Lower California, and through the Tehachapi Mountains to the Greenhorn Mountains. Type locality: "California." Collected by Douglas. March-May.

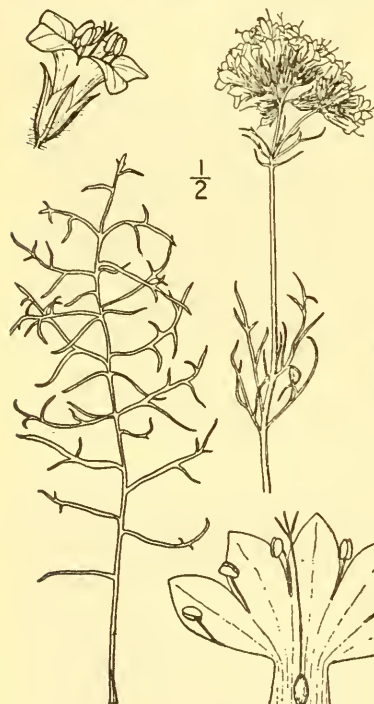
Gilia achilleaeifolia subsp. *staminea* (Greene) Mason & Grant, Madroño 9: 208. 1948. (*Gilia staminea* Greene, Erythea 3: 105. 1895; *G. capitata* var. *staminea* Brand, Pflanzenreich 4250: 111. 1907; *G. capitata* var. *achilleaeifolia* Mason ex Jepson, Man. Fl. Pl. Calif. 795. 1925.) Heads densely flowered, simple, elongate or 2 or 3 aggregated together, the flowers subsessile to sessile; buds characteristically spherical, densely arachnoid-villous or floccose to glabrate, frequently only the tips of the calyx-lobes visible; stamens exceeding the corolla-lobes, often conspicuously so; flowers pale violet; corolla-throat usually shorter than the corolla-tube. Antioch, Contra Costa County, California, south through the San Joaquin Valley and its western borders to the Tehachapi Mountains; southern California to San Diego County. Type locality: "interior of California."

Gilia achilleaeifolia subsp. *Chamissonis* (Greene) Brand, Pflanzenreich 4250: 111. 1907. (*Gilia Chamissonis* Greene, Erythea 3: 105. 1895; *G. achilleaeifolia* subsp. *Chamissonis* var. *tomentosa* Eastw. ex Brand, loc. cit.; *G. achilleaeifolia* var. *Chamissonis* Nels. & Machr. Bot. Gaz. 61: 34. 1916; *G. capitata* var. *regina* Jepson, Man. Fl. Pl. Calif. 795. 1925; *G. Chamissonis* var. *regina* Jepson, Fl. Calif. 3: 185. 1943.) Like the preceding subspecies; flowers subsessile to sessile in dense heads, calyces villous or floccose; stamens not always longer than corolla-lobes; flowers, including calyx, deep purple; stems stout and conspicuously glandular with a mephitic odor; basal leaves in a prominent rosette. Seacoast sand hills, Humboldt County to San Luis Obispo County, California. Type locality: sand hills of San Francisco.





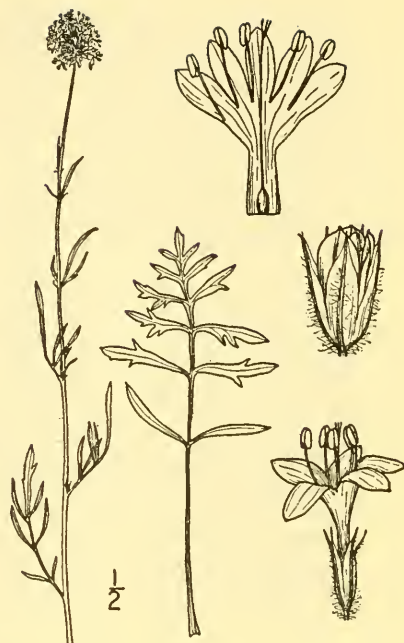
4017



4019



4020



4018



4021

4017. *Gilia Ripleyi*
4018. *Gilia capitata*

4019. *Gilia achilleaefolia*
4020. *Gilia multicaulis*

4021. *Gilia tricolor*

10. *Gilia multicaulis* Benth. Many-stemmed *Gilia*. Fig. 4020.

Gilia multicaulis Benth. Bot. Reg. 19: under *pl.* 1622. 1833.

Gilia multicaulis var. *tenera* A. Gray, Proc. Amer. Acad. 8: 278. 1870.

Gilia multicaulis var. *alba* Milliken, Univ. Calif. Pub. Bot. 2: 35. 1904.

Gilia multicaulis subsp. *eu-multicaulis* Brand, Pflanzenreich 4²⁵⁰: 109. 1907.

Gilia multicaulis subsp. *eu-multicaulis* var. *alba* Brand, op. cit. 110.

Gilia multicaulis var. *clivorum* Jepson, Fl. Calif. 3: 187. 1943.

Erect annual, 1–4 dm. tall, stems slender, lightly to densely puberulent or glabrate, rarely villous, usually densely stipitate-glandular above, simple or branched from near base or above. Basal leaves sometimes in rosette, glabrous or pubescent as on stems, simple-pinnate or bipinnate, 2–8 cm. long, rachis and lobes filiform to rarely 1.5 mm. broad, 2–15 mm. long, often minutely cuspidate; cauline leaves like the basal except becoming shorter above, the uppermost simple-pinnate with few lobes; flowers in terminal, 2–6-flowered glomerules; pedicels 1–6.5 mm. long, elongating in age; calyces usually densely puberulent or stipitate-glandular, rarely villous, 2.5–6 mm. long in flower, becoming 4.5–8 mm. in fruit, lobes joined in lower one-half to two-thirds by a narrow, purple membrane which also flanks them above; corolla funnelform, 5–10.5 mm. long, tube 1.5–4 mm. long, throat 1–3.5 mm., lobes 1–4 mm., pale or deep blue-violet with throat and tube lighter or yellow, often with five purple spots in the throat; stamens inserted in the sinuses of the corolla-lobes, and exceeded by them (0.5–2 mm. long); anthers blue; style shorter than to subequal to corolla; stigma 0.5–1.5 mm. long; capsule ovoid, 4–7 mm. long, 3-celled, with several to numerous brown seeds in each cell.

Sandy or gravelly areas, Transition Zone; Outer and Inner Coast Ranges, Colusa and Yolo Counties, California, south to San Diego County and Lower California; inland to western San Bernardino and Riverside Counties; Santa Cruz Island. Type locality: California. Collected by Douglas. March–May.

Gilia multicaulis subsp. *millefoliata* (Fisch. & Mey.) Mason & Grant, Madroño 9: 209. 1948. (*Gilia millefoliata* Fisch. & Mey. Ind. Sem. Hort. Petrop. 5: 35. 1838; *G. millefoliata* var. *maritima* Brand, Pflanzenreich 4²⁵⁰: 100. 1907; *G. multicaulis* var. *millefoliata* Jepson, Man. Fl. Pl. Calif. 796. 1925.) Stems stout, often much-branched from base, densely glandular-pubescent; leaves somewhat fleshy, simple-pinnate to bipinnate, the primary lobes 2–10 mm. long, 0.6–1.5 mm. broad, secondary lobes to 4 mm.; calyces 5–7 mm. long in flower, 7–11.5 mm. in fruit, glandular as the stems; corolla 5–7 mm. long, throat yellow with 5 prominent, dark purple spots; mature capsules 6–8.5 mm. long, exceeded by calyx. Seacoast sand dunes, Lincoln County, Oregon, to San Francisco, California. Type locality: Bodega, Sonoma County, California.

Gilia multicaulis subsp. *Nevinii* (A. Gray) Mason & Grant, loc. cit. (*Gilia multicaulis* var. *millefolia* A. Gray ex S. Wats. Proc. Amer. Acad. 11: 118. 1876; *G. Nevinii* A. Gray, Syn. Fl. N. Amer. ed. 2. 2^a: 411. 1886; *G. multicaulis* var. *Nevinii* Jepson, Man. Fl. Pl. Calif. 796. 1925.) Stems stout and glandular as in subsp. *millefoliata*, but leaves bipinnate to tripinnate and finely cut, the primary lobes 4–23 mm. long, 0.1–0.5 mm. broad, the secondary lobes 2–7.8 mm. long; calyx 5–8.5 mm. long in flower, 6.4–8.2 mm. in fruit, glandular as the stems; corolla 10–13 mm. long, the tube 3.5–7 mm., throat not purple-spotted; mature capsules 6.5–8 mm. long. San Clemente Island, California, and Guadalupe Island, Lower California. Type locality: San Clemente Island, California.

Gilia multicaulis subsp. *peduncularis* (Eastw.) Mason & Grant, loc. cit. (*Gilia peduncularis* Eastw. ex Milliken, Univ. Calif. Pub. Bot. 2: 34. 1904; *G. pedunculata* Eastw. Bot. Gaz. 37: 446. 1904; *G. pedunculata* var. *calycina* Eastw. op. cit. 447; *G. pedunculata* var. *minima* Eastw. loc. cit.; *G. peduncularis* var. *typica* Brand, Pflanzenreich 4²⁵⁰: 107. 1907; *G. peduncularis* var. *typica* subvar. *calycina* Brand, op. cit. 108; *G. multicaulis* var. *peduncularis* Jepson, Fl. Calif. 3: 187. 1943.) Stems slender, less leafy than typical *G. multicaulis*; flowers solitary at tips of elongate pedicels. Contra Costa County to Santa Barbara County, California. Type locality: Duard's Ranch and Olano Creek, near boundary between Santa Barbara and San Luis Obispo Counties, California.

11. *Gilia tricolor* Benth. Tricolor *Gilia*. Fig. 4021.

Gilia tricolor Benth. Bot. Reg. 19: under *pl.* 1622. 1833.

Erect annual, 0.5–3 dm. tall, stems simple or branched, lightly pubescent or villous to glabrate, usually densely stipitate-glandular or puberulent above and on pedicels and calyces. Lower leaves 1.5–10 cm. long, sometimes forming rosette at base, bipinnately lobed, the rachis and lobes filiform, glabrous, to lightly pubescent or villous; upper leaves somewhat shorter, becoming reduced and bract-like in the inflorescence; inflorescence a terminal, 2–4 flowered cyme; pedicels 1–4 mm. long and elongating in fruit; calyx 4–6.5 mm. long, usually exceeding the pedicel and elongating with and exceeding the capsule, lobes bordered and joined in lower one-half to two-thirds by a narrow purple membrane; corolla broadly funnelform, 10–19 mm. long, tube 2–5 mm. long, yellow, throat 5–7 mm., bearing five irregular, deep purple spots which often merge into a ring, lobes 3–8 mm., light blue-violet at the tips and lighter or yellowish within; stamens equal to subequal, 2–3 mm. long, inserted in sinuses of corolla-lobes and exceeded by them; anthers light blue; style shorter than to subequal to corolla; stigma-lobes 1–2 mm. long; capsule ovoid, 4–6 mm. long; seeds small, brown, several in each cell.

Valleys, Upper Sonoran Zone; Coast Ranges from Humboldt County, California, south to San Luis Obispo County; Sierra Nevada foothills, Butte County to Mariposa County; Sacramento and San Joaquin Valleys. Type locality: California. Collected by Douglas. March–May.

Gilia tricolor subsp. *diffusa* (Congdon) Mason & Grant, Madroño 9: 209. 1948. (*Gilia diffusa* Congdon, Erythraea 7: 186. 1900; *Gilia tricolor* var. *longipedicellata* Greene, Rhodora 6: 154. 1904; *Gilia inconspicua* subsp. *sinuata* var. *oreophila* subvar. *diffusa* Brand, Pflanzenreich 4²⁵⁰: 105. 1907.) Flowers solitary, borne on elongate pedicels (1–4 cm. long); calyces always exceeded by pedicels; corollas generally smaller than in typical *Gilia tricolor* (7–14.5 mm. long); plants often diffusely branched, Sacramento and San Joaquin Valleys, California, and bordering Inner Coast Ranges and Sierra Nevada foothills from Tehama County on the west and Placer County on the east, south to the Tehachapi Mountains. Type locality: New Coulterville Road, Mariposa County.

12. *Gilia ochroleuca* M. E. Jones. Desert *Gilia*. Fig. 4022.

Gilia ochroleuca M. E. Jones, Contr. West. Bot. No. 8: 35. 1898.

Gilia inconspicua subsp. *eu-inconspicua* var. *ochroleuca* Brand, Pflanzenreich 4²⁵⁰: 105. 1907.

Erect annual, 0.5–3 dm. tall, stems paniculately branched, woolly-pubescent to glabrous

below, glandular-dotted above. Basal leaves 1–6.5 cm. long, in rosette, pinnately or bipinnately lobed, the lobes linear, equal in breadth to the rachis (0.8–2 mm.), lightly to densely woolly or glabrous; cauline leaves shorter, pinnately lobed, the rachis and lobes narrowly linear, lobes longer than the width of the rachis; inflorescence paniculately branched, the main branches virgate; flowers single, terminating the branchlets or lateral on short pedicels; pedicels glandular-dotted; calyx 2.7–5.4 mm. long, lobes glandular-dotted or glabrous, often purple-tinged at tips, joined in lower one-half to three-fourths by sinus-membrane; corolla funnelform, 4.5–9.8 mm. long, tube 1.5–3.6 mm., blue-violet or yellow, throat 1.1–1.8 mm., yellow, lobes 1.3–1.8 mm., light violet; stamens inserted in sinuses of corolla-lobes, 0.8–1.7 mm. long, exceeded by corolla-lobes; style shorter than corolla; stigma 0.5–1.5 mm. long; capsule ovoid, 3.5–7.2 mm. long, 3-celled, containing several, light brown, nearly smooth to irregularly rugose seeds in each cell.

Sonoran and Transition Zones; eastern Washington south through eastern Oregon and along eastern side of Sierra Nevada in California and Nevada; Mojave Desert, California, south to Lower California, east to Wyoming, Utah, Arizona, and New Mexico. Type locality: Darwin Mesa, California. April–June.

Gilia ochroleuca subsp. *transmontana* Mason & Grant, *Madroño* 9: 215. 1948. Leaf-lobes 1–2 mm. wide, main branches of inflorescence virgate, the inflorescence narrow. Eastern Washington and Oregon southeast of the Sierra Nevada to the mountains of southern California and northern Lower California. Type locality: Beaver Dam River, Mohave County, Arizona.

13. *Gilia Abrámsii* (Brand) Mason & Grant. Abrams' *Gilia*. Fig. 4023.

Gilia arenaria var. *Abramsii* Brand, Ann. Conserv. & Jard. Bot. Genève 15–16: 330. 1913.

Gilia Abramsii Mason & Grant, *Madroño* 9: 216. 1948.

Erect annual, 12–38 cm. tall; stems several from base, abundantly slender-branched, glabrous or woolly-pubescent below, glandular above and on pedicels. Basal leaves numerous, entire, simple-pinnate or bipinnate, 2–7 cm. long, with few to numerous minutely cuspidate, linear lobes, 2–17 mm. long, glabrous or lightly woolly-pubescent; cauline leaves shorter and reduced, entire, simple-pinnate or bipinnate below or palmately parted with 3 to several lobes; inflorescence divaricately much-branched with 1-flowered filiform pedicels, 0.5–1.5 cm. long; calyx 2–3 mm. long, lobes glabrous or glandular-dotted, joined in lower two-thirds by sinus-membrane; corolla funnelform, pale blue-violet to pale pink or yellowish, 9.5–12 mm. long, 4–5 times calyx; tube 2.5–4.5 mm., throat 2.5–4.5 mm., broadly and abruptly expanded, lobes 2.5–3.5 mm. long; stamens inserted in sinuses of corolla-lobes, 1–1.5 mm. long; style well-exserted from throat, 9–10 mm. long; stigma 1.5 mm. long; capsule plump, ovoid, 3–4 mm. long; seeds brown and irregularly rugose, several in each cell.

Transition Zone; mountains of Santa Barbara and Ventura Counties, and the San Gabriel and San Jacinto Mountains, California, south to northern Lower California. Type locality: Tia Juana River, Tia Juana, Lower California. March–May.

Gilia Abramsii subsp. *integrifolia* Mason & Grant, *Madroño* 9: 216. 1948. Basal leaves mostly simple and entire, linear, occasionally a few with 1 or 2 linear lobes. Known only from the type locality: Temecula Canyon, Riverside County, California.

14. *Gilia tenuiflora* Benth. Slender-flowered *Gilia*. Fig. 4024.

Gilia tenuiflora Benth. Bot. Reg. 19: under *pl.* 1622. 1833.

Gilia arenaria Benth. loc. cit.

Gilia tenuiflora subsp. *eu-tenuiflora* Brand, Pflanzenreich 4²⁵⁰: 102. 1907.

Gilia tenuiflora subsp. *eu-tenuiflora* var. *genuina* Brand, loc. cit.

Gilia arenaria subsp. *leptantha* var. *eu-arenaria* Brand, op. cit. 103.

Gilia arenaria subsp. *leptantha* var. *Alcieae* Brand, loc. cit.

Gilia Hoffmannii Eastw. Leaflets West. Bot. 2: 283. 1940.

Gilia tenuiflora var. *arenaria* Jepson, Fl. Calif. 3: 178. 1943.

Erect annual, 0.5–5 dm. tall, stems glabrous or sparsely woolly-pubescent below, glandular-dotted above, branched from base or above, sometimes simple except in the inflorescence. Basal leaves 3–9 cm. long, in rosette, glabrous or sparsely woolly, simple-pinnate or occasionally bipinnate with narrow rachis and narrowly linear lobes, or sometimes the lobes reduced to teeth; upper leaves shorter, simple-pinnate with narrowly linear lobes, or the uppermost entire; inflorescence paniculate, loose to subglomerate; flowers borne singly at tips of glandular-dotted pedicels; calyx 2.5–6 mm. long, glandular-dotted or sparsely woolly to glabrate, cleft to base, the purplish or dark green lobes contrasting sharply with the light-colored sinus-membrane which joins them in the lower one-half to three-fourths; corolla funnelform, 9–28 mm. long, 3–6 times the calyx, tube 4.5–14 mm. long, 1–2.5 times throat, throat 2–8 mm., lobes 3.5–8.5 mm., narrowly to broadly ovate, tube and lower throat dark purple, often dorsally striated with yellow, upper throat yellow, lobes light violet or with yellow striation dorsally; stamens inserted in sinuses of corolla-lobes, subequal to unequal, 1–4 mm. long, exceeded by corolla-lobes; style included or exserted, stigma 0.5–2 mm. long; capsule ovoid, 3–5 mm. long, containing numerous, dark brown, irregularly angled seeds in each cell.

Sandy flats and gravelly hillsides, Upper Sonoran Zone; Outer and Central Coast Ranges from Santa Cruz and San Benito Counties south to Santa Barbara County, California. Type locality: California. Collected by Douglas. April–May.

Gilia tenuiflora subsp. *interior* Mason & Grant, *Madroño* 9: 217. 1948. Corolla 6–14 mm. long, 2–4 times calyx, tube 3–5 mm. long, purple, throat yellow with 5 purple spots subtending the light violet lobes; stems erect or much-branched and spreading from the base, barely exceeding the basal rosette; leaves lightly to moderately woolly-pubescent. Inner Coast Ranges from the Mount Hamilton Range in Stanislaus County, California, to Santa Barbara County; southern San Joaquin Valley, and mountains of Kern County; western Mojave Desert. Type locality: Walker Pass, Kern County, California.

15. *Gilia latiflora* A. Gray. Broad-flowered *Gilia*. Fig. 4025.

Gilia tenuiflora var. *latiflora* A. Gray, Proc. Amer. Acad. 8: 278. 1870.

Gilia latiflora A. Gray, Syn. Fl. N. Amer. 2¹: 147. 1878.

Gilia Davyi Milliken, Univ. Calif. Pub. Bot. 2: 30. 1904.

Gilia tenuiflora subsp. *latiflora* Brand, Pflanzenreich 4²⁵⁰: 102. 1907.

Gilia tenuiflora subsp. *latiflora* var. *excellens* Brand, op. cit. 103.

Gilia arenaria subsp. *exilis* var. *Davyi* Brand, op. cit. 104.

Gilia tenuiflora var. *Davyi* Mason ex Jepson, Man. Fl. Pl. Calif. 798. 1925.

Erect annual, 0.5–6.5 dm. tall; stem stout, paniculately branched from base or above, lightly to conspicuously pubescent below with fine, long, curled and tangled hairs, (woolly), glandular-pubescent above. Basal leaves in rosette, 1.5–11 cm. long, strap-shaped, pinnate or pectinate with short lateral lobes or teeth, the lobes often toothed around margins, the cauline similar but shorter and much-reduced and bracteate above, pubescence of basal and the lower cauline lightly to densely woolly; inflorescence a subcymose panicle, the flowers short-pedicellate or subglomerate; calyx 2.5–7.3 mm. long, growing with and more or less equal in length to the mature capsule, cleft to base, with sinuses three-fourths filled with a membrane which also borders lobes to their acuminate tips, lobes and membrane sometimes purplish, the lobes always dotted with black or colorless glandular hairs; corolla broadly funnelform, 15–27.5 mm. long, 3.5–5.5 times as long as calyx, blue or violet to pinkish with a yellow band around upper half of throat, tube usually dark violet, 2.5–10.5 mm. long, less than twice the throat, throat 3.5–10.4 mm. broadly expanded, lobes 5.4–9.5 mm., broadly ovate, usually with a broad mucronate tip; stamens inserted in sinuses of corolla-lobes, unequal to subequal in length, shorter or longer than lobes, filaments 0.5–5 mm. long, anthers 0.5–2 mm. long; stigma 1.5–3 mm. long, purple, exserted; capsule ovoid, 3-celled, 4.4–9 mm. long; seeds irregularly angled, minutely pitted, 3 to many in each cell.

Desert slopes, Sonoran Zones; Mojave Desert in Kern, Los Angeles, western San Bernardino, and western Inyo Counties, California. Type locality: Los Angeles County. April–May.

Gilia latiflora subsp. *cana* (M. E. Jones) Mason & Grant, Madroño 9: 218. 1948. (*Gilia latiflora* var. *cana* M. E. Jones, Contr. West Bot. No. 8: 35. 1898; *G. collina* var. *coronata* Brand, Pflanzenreich 4²⁵⁰: 101. 1907 (Feb.); *G. cana* Heller, Muhlenbergia 2: 266. 1907 (April); *G. latiflora* var. *cana* M. E. Jones, Contr. West Bot. No. 12: 54. 1908; *G. tenuiflora* var. *cana* Jepson, Man. Fl. Pl. Calif. 798. 1925.) Basal rosette low, dense, the leaves with stout rachis and broad lobes, the lobes toothed on the margins and densely tufted with grayish woolly pubescence; stems densely glandular-pubescent; inflorescence a congested, subcymose panicle; calyces glandular or woolly like the leaves; corolla 17–23 mm. long, the tube 2–3.2 times as long as the throat; stamens shorter than corolla-lobes. Desert washes, Sonoran Zones; east slope of the Sierra Nevada, 4,600 to 10,000 feet, Inyo and Mono Counties, California. Type locality: Lone Pine, Inyo County, 4,600 feet.

Gilia latiflora subsp. *speciosa* (Jepson) Mason & Grant, loc. cit. (*Gilia tenuiflora* var. *speciosa* Jepson, Fl. Calif. 3: 181. 1943.) Differs from the species in the long tube which is 2–8.5 times as long as the throat; corolla 18–56 mm. long, tube stout, 10–39 mm. long. Sonoran Zones; Mojave Desert in northeastern Kern County, California, and neighboring regions of San Bernardino and Tulare Counties. Type locality: Red Rock Canyon, El Paso Mountains, California.

Gilia latiflora subsp. *Purpusii* (Milliken) Mason & Grant, loc. cit. (*Gilia tenuiflora* var. *Purpusii* Milliken, Univ. Calif. Pub. Bot. 2: 29. 1904 (May); *G. collina* Eastw. Bot. Gaz. 37: 445. 1904 (June); *G. collina* var. *typica* Brand, Pflanzenreich 4²⁵⁰: 101. 1907.) Stems slender, virgate, usually branched from near base; basal leaves short, conspicuously woolly-pubescent, pinnately short-lobed, the lobes crowded, toothed around margins or entire; corolla 13–25 mm. long, the tube filiform, 2.5–4.5 times the short throat; stamens shorter or longer than the corolla-lobes. Sonoran and Arid Transition Zones; southern Sierra Nevada, 4,300 to 8,500 feet, in Tulare County, California. Type locality: Hockett Meadows.

Gilia latiflora subsp. *triceps* (Brand) Mason & Grant, op. cit. 219. (*Gilia tenuiflora* subsp. *eu-tenuiflora* var. *triceps* Brand, Pflanzenreich 4²⁵⁰: 102. 1907; *G. tenuiflora* subsp. *eu-tenuiflora* var. *triceps* subvar. *speciosissima* Brand, loc. cit.) This subspecies notable for its inflorescence, which is a full, many-flowered, corymbose panicle; pedicels filiform; corolla 12–29 mm. long with filiform tube which is 1.5–2.5 times as long as the throat; stamens 1–2 mm. long, exceeded by corolla-lobes; stems somewhat more leafy than in the species; leaves typically bipinnate, the lobes divaricately and irregularly toothed, the teeth usually acute, sometimes arcuate. Sonoran Zones; desert ranges of Inyo and eastern San Bernardino Counties, California, and bordering regions in Nevada. Type locality: San Bernardino.

Gilia latiflora subsp. *leptantha* (Parish) Mason & Grant, loc. cit. (*Gilia leptantha* Parish, Zoe 5: 74. 1900; *G. arenaria* subsp. *leptantha* Brand, Pflanzenreich 4²⁵⁰: 103. 1907.) Leaves and habit like subsp. *exilis* but corolla-tube longer (2–5 times throat) and stamens longer than corolla-lobes; corolla 9.5–18.5 mm. long. Upper Sonoran and Arid Transition Zones; Mount Pinos, Ventura County, and the San Bernardino Mountains, California. Type locality: Seven Oaks, San Bernardino Mountains.

Gilia latiflora subsp. *exilis* (A. Gray) Mason & Grant, loc. cit. (*Gilia latiflora* var. *exilis* A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 411. 1886; *G. exilis* Abrams, Fl. Los Angeles ed. 3. 289. 1917; *G. arenaria* subsp. *exilis* Brand, Pflanzenreich 4²⁵⁰: 104. 1907; *G. tenuiflora* var. *exilis* Jepson, Fl. Calif. 3: 178. 1943.) Plant usually less than 15 cm. tall, stems slender, much-branched from near base or above; basal leaves once or twice pinnately short-toothed, moderately to densely woolly-pubescent, the rosette prominent with cauline leaves much-reduced; corolla 9.6–13 mm. long, the tube included in the calyx, equal to or exceeded by the full throat; stamens shorter than corolla-lobes. Upper Sonoran and Arid Transition Zones; San Gabriel and San Bernardino Mountains in southern California. Type locality: southern California, east to Nevada.

16. *Gilia sinuata* Dougl. Sinuate *Gilia*. Fig. 4026.

Gilia sinuata Dougl. ex Benth. in A. DC. Prod. 9: 313. 1845.

Gilia inconspicua var. *sinuata* A. Gray, Bot. Calif. 1: 498. 1876.

Gilia arenaria subsp. *leptantha* var. *borealis* Brand, Pflanzenreich 4²⁵⁰: 103. 1907.

Gilia inconspicua subsp. *sinuata* Brand, op. cit. 105.

Gilia inconspicua subsp. *sinuata* var. *deserti* Brand, loc. cit.

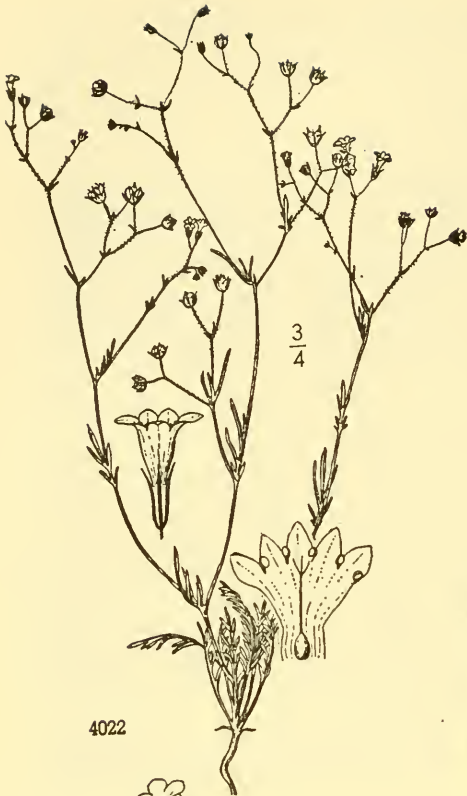
Gilia ophthalmoides Brand, op. cit. 108.

Gilia inconspicua var. *diegensis* Munz, Man. S. Calif. 395. 1935.

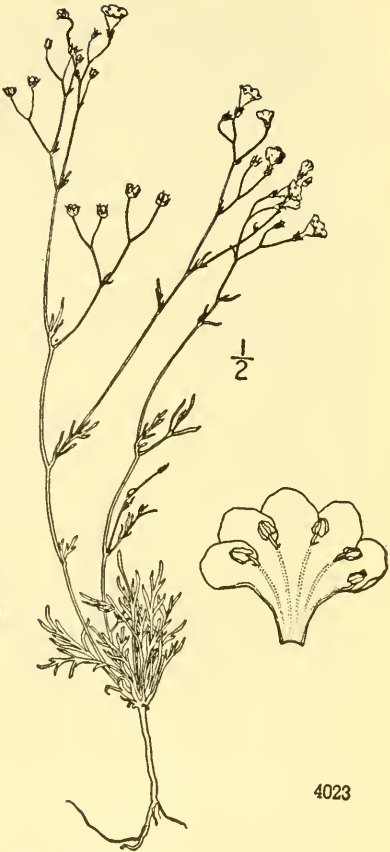
Gilia modocensis Eastw. Leaflets West. Bot. 2: 283. 1940.

Gilia tenuiflora var. *sinuata* Jepson, Fl. Calif. 3: 179. 1943.

Erect annual, 0.5–3 dm. tall, simple or branched from base or above, glabrous or woolly-



4022



4023



4024

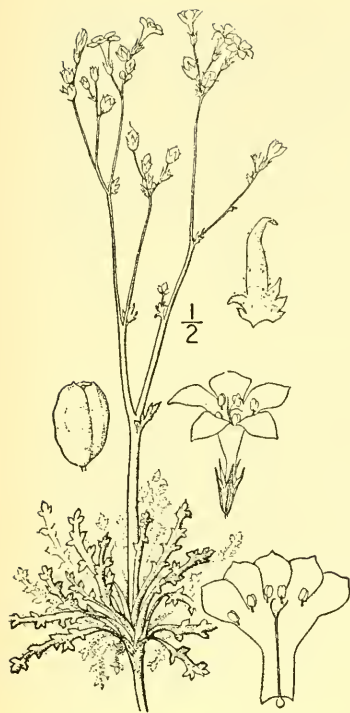


4025

4022. *Gilia ochroleuca*
4023. *Gilia Abramsii*

4024. *Gilia tenuiflora*

4025. *Gilia latiflora*



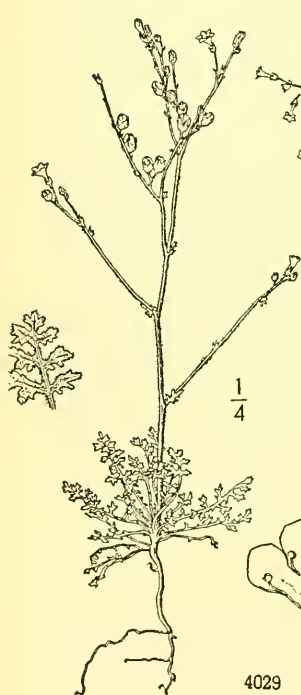
4026



4027



4028



4029



4031



4030. *Gilia scopulorum*
4031. *Gilia leptomeria*

4026. *Gilia sinuata*
4027. *Gilia splendens*

4028. *Gilia caruifolia*
4029. *Gilia stellata*

pubescent below, glandular above or throughout. Lower leaves in rosette, glabrous or lightly to densely woolly, sinuately toothed or lobed or bipinnately lobed, the cauline reduced, becoming bract-like above, usually broad or ovate and toothed, the teeth shorter than the width of the rachis; inflorescence paniculately branched, the flowers single at ends of terminal or short lateral branchlets, the pedicels glandular-dotted; calyx 2.5–5.2 mm. long, glandular-dotted, the lobes joined in lower one-half to three-fourths by the sinus-membrane; corolla funnelform, 6–12.8 mm. long, tube 3–6 mm., yellow or violet, throat 1.4–3.8 mm., yellow, lobes 1–4.2 mm. long, blue-violet to violet or pink; stamens inserted in sinuses of corolla-lobes, 0.5–4.5 mm. long, usually exceeded by corolla-lobes; style shorter or longer than corolla; stigma 0.5–1.3 mm. long; capsule 4–5.5 mm. long, ovoid, containing numerous irregularly angled brown seeds in each cell.

Arid Transition Zone; eastern Washington and Oregon, south in California and Nevada on the east slope and just east of the Sierra Nevada, west through the Mojave Desert to Ventura County, California, and south to Lower California. Type locality: near Okanogan on the Columbia River. Collected by Douglas. April–June.

17. *Gilia splendens* Dougl. Splendid Gilia. Fig. 4027.

Gilia splendens Dougl. ex Paxton, Paxton Mag. Bot. 3: 260. 1837.

Gilia tenuiflora var. *altissima* Parish, Erythea 6: 90. 1898.

Gilia tenuiflora subsp. *eu-tenuiflora* var. *genuina* subvar. *altissima* Brand, Pflanzenreich 4250: 102. 1907.

Erect annual, 1–8 dm. tall; stems stout and leafy below, slender and nearly naked above, glabrate below, becoming increasingly glandular above, paniculately branched. Lower leaves 3–12 cm. long, bi- or tripinnate with slender rachis, the lobes not at all crowded, slender and finely toothed or short-lobed, 0.4–2 cm. long, pubescent with coarse, translucent or silvery, glandular hairs; cauline leaves mostly much-reduced, simple, entire, bract-like; flowers solitary on glandular-dotted pedicels; calyx 3–4 mm. long, exceeded by maturing capsule, lobes glabrous, joined in lower two-thirds by sinus-membrane; corolla funnelform, 14–23 mm. long, rose or bright pink, tube 3–7 mm. long, shorter than to subequalling throat, throat 5.5–8.5 mm., lobes 3.5–7.5 mm.; stamens inserted in sinuses of corolla-lobes, unequal to subequal, shorter than corolla-lobes with filaments 0.5–2.5 mm. and anthers 0.8–1.2 mm.; style subequalling corolla; stigmas 1.5–2.5 mm. long; capsule oblong, 3.8–7.3 mm. long, 3-celled with 3 to many pitted and irregularly-angled, brown seeds in each cell.

Grassy slopes, Transition Zone; coastal mountains of California in central Monterey, Santa Barbara and Ventura Counties to the San Gabriel, San Bernardino, and San Jacinto Mountains. Type locality: California. Collected by Douglas. April–June.

Gilia splendens subsp. *Grinnellii* (Brand) Mason & Grant, Madroño 9: 213. 1948. (*Gilia collina* var. *Grantii* Brand, Pflanzenreich 4250: 101. 1907; *Gilia Grinnellii* Brand, loc. cit.; *Gilia tenuiflora* var. *Grinnellii* Jepson, Fl. Calif. 3: 179. 1943.) Flowers longer (20–37 mm.) due to the elongate corolla-tube which much exceeds the throat. San Gabriel and San Bernardino Mountains, California. Type locality: Switzers Trail, Mount Wilson, Los Angeles County, California.

Gilia splendens subsp. *australis* Mason & Grant, loc. cit. Capsules 5–7 mm. long, corolla much shorter than the species but with a proportionately longer limb. San Bernardino and Riverside Counties, California, to Lower California. Type locality: Temecula Valley, Riverside County, California.

18. *Gilia caruifolia* Abrams. Caraway-leaved Gilia. Fig. 4028.

Gilia caruifolia Abrams, Bull. Torrey Club 32: 540. 1905.

Gilia arenaria subsp. *exilis* var. *caruifolia* Brand, Pflanzenreich 4250: 104. 1907.

Gilia latiflora var. *caruifolia* Jepson, Man. Fl. Pl. Calif. 798. 1925.

Gilia tenuiflora var. *caruifolia* Munz, Man. S. Calif. 394. 1935.

Erect annual, 1–8.5 dm. tall; stems at base glabrous or pubescent (as on leaves) or glandular, the inflorescence glandular-dotted, paniculately branched from near base or above. Lower leaves 2–11 cm. long, bi- or tripinnate with slender rachis, the lobes not at all crowded, slender and finely toothed or short-lobed, 2–14 mm. long; pubescent with coarse, translucent or silvery glandular hairs; cauline leaves of inflorescence mostly reduced, small, and the uppermost usually simple, entire, and bract-like; flowers solitary on glandular-dotted pedicels; calyx 2.7–3.8 mm. long, exceeded by mature capsule, lobes glabrous to sparsely glandular-dotted, joined in lower two-thirds by sinus-membrane; corolla funnelform, 7–12.5 mm. long, blue-violet, lavender, pale pink or white, the throat apparently lighter and purple-dotted, tube 3–3.8 mm. long, throat 1.4–2.8 mm. (one-half to two-thirds as long as corolla-tube), lobes 2.7–6 mm.; stamens inserted in middle of throat, unequal in length; filaments 2.5–5.7 mm. long, the longest well-exserted; anthers 0.5–1 mm. long; style shorter or a little longer than corolla; stigmas 1.5–2.5 mm. long; capsule oblong, 4–5 mm. long; seeds numerous in each cell, dark brown, pitted and irregularly angled.

Arid Transition Zone; mountains of San Diego County, California, to Lower California. Type locality: Cuyamaca Mountains, between Cuyamaca Lake and Oriflamme Canyon. April–May.

19. *Gilia stellata* Heller. Star Gilia. Fig. 4029.

Gilia stellata Heller, Muhlenbergia 2: 117. 1906.

Gilia tenuiflora var. *Newloniana* Jepson, Fl. Calif. 3: 179. 1943.

Erect annual, 1–4 dm. tall, stems stout, paniculately branched from near base or above, pubescence of geniculate hairs below (as on leaves) becoming stipitate-glandular above. Lower leaves bi- or tripinnately dissected, 2–10 cm. long, the lobes at broad angle to rachis, primary lobes asymmetrically toothed or lobed, each tipped with a callous cusp, densely pubescent with short, coarse, white, geniculate hairs; upper leaves much-reduced, becoming bract-like above, but not entire, the uppermost usually 3-cleft or toothed; inflorescence paniculate, the flowers borne singly on short, stout, stipitate-glandular pedicels toward ends of branches; calyx 3.2–

4.2 mm. long, enlarging with and equal (in length) to the maturing capsule, the lobes stipitate-glandular and joined in lower two-thirds by sinus-membrane; corolla funnelform, 6.3–10.4 mm. long, pale blue or lavender to white, the throat bearing a ring of purple spots, tube 2.3–3.2 mm. long, included in calyx, throat 1.8–3.4 mm., lobes 2.2–3.7 mm.; stamens inserted in sinuses of corolla-lobes, subequal, shorter than corolla-lobes, the filaments 0.7–1.7 mm. long, anthers 0.5–1 mm. long; style shorter than corolla, included in or exerted from throat; stigma 1–1.5 mm. long; capsule broadly ovoid, 5–7 mm. long, 3-celled with numerous brown, pitted, irregularly-angled seeds in each cell.

Desert slopes, Upper Sonoran Zone; Death Valley, Mojave and Colorado Deserts in California, east and south through southern Nevada and southern Utah to Arizona, northwestern Mexico, and Lower California. Type locality: near Randsburg, Kern County, California. April–May.

20. *Gilia scopulorum* M. E. Jones. Rock Gilia. Fig. 4030.

Gilia scopulorum M. E. Jones, Bull. Torrey Club 8: 70. 1881.

Gilia scopulorum var. *typica* Brand, Pflanzenreich 4²⁵⁰: 109. 1907.

Gilia scopulorum var. *Covillei* Brand, loc.cit.

Erect annual, 1–3 dm. tall; stems stout, paniculately branched from near base and above; pubescent with translucent hairs (as on leaves) below and stipitate-glandular above. Lower leaves 3–9 cm. long, broad but deeply and irregularly cleft, simple-pinnate to bipinnate, primary lobes 5–12 mm. long, the ultimate lobes usually margined with cuspidate teeth, coarsely pubescent with straight, translucent hairs; upper leaves reduced in size and somewhat simpler, becoming bract-like above, but even the uppermost 3-toothed, not entire; inflorescence paniculate, the flowers solitary at ends of stipitate-glandular pedicels; calyx stipitate-glandular 3–4.3 mm. long, enlarging with the maturing capsule, cleft to base, the lobes joined in lower one-half to three-fourths by sinus-membrane; corolla funnelform, 10–14.5 mm. long, lobes pink to violet or white, tube and throat paler or yellowish, tube 6–8.5 mm. long, throat 2.5–4 mm., lobes 1.4–3.4 mm.; stamens inserted in sinuses of corolla lobes, equal or subequal, exceeded in length by corolla-lobes, filaments 0.7–0.9 mm. long, anthers 0.5–0.7 mm.; style subequal to or shorter than corolla, stigma 0.5–2 mm. long; capsule broadly ovoid, 4.5–5.5 mm. long, 3-celled with numerous, irregularly angled brown seeds in each cell.

Desert washes, Lower Sonoran Zone; Death Valley, eastern Mojave Desert, and Colorado Desert in California, east to Utah and Arizona. Type locality: "in the shade of the lava rocks at St. George," Utah. April–May.

21. *Gilia leptomeria* A. Gray. Great Basin Gilia. Fig. 4031.

Gilia leptomeria A. Gray, Proc. Amer. Acad. 8: 278. 1870.

Gilia Triodon Eastw. Zoe 4: 121. 1893.

Gilia leptomeria var. *tridentata* M. E. Jones, Proc. Calif. Acad. II. 5: 713. 1895.

Aliciclla Triodon Brand, Helios 22: 77. 1905.

Aliciclla Triodon var. *humillima* Brand, Pflanzenreich 4²⁵⁰: 150. 1907.

Gilia leptomeria var. *myriacantha* M. E. Jones, Contr. West. Bot. No. 12: 53. 1908.

Gilia inconspicua var. *dentiflora* Davidson, Bull. S. Calif. Acad. 25: 84. 1926.

Erect annual, 4–33 cm. tall; stems 1 to several from base, much-branched in the inflorescence, puberulent or glandular-puberulent below, glandular-puberulent above. Basal leaves in rosette, numerous, 1–9.5 cm. long, 2–18 mm. wide, broadly strap-shaped, linear to oblanceolate, sinuately toothed or shallow-lobed, each tooth or lobe bearing a sharp cusp; cauline leaves 2–20 mm. long, linear to narrowly ovate, entire or pinnately toothed; flowers borne terminally or on short lateral pedicels; calyx 2.3 mm. long, cleft to base, the lobes glandular-puberulent, joined in lower two-thirds by a sinus-membrane, in fruit one-half to as long as capsule; corolla narrow-funnelform, 3–6.5 mm. long, tube 1.5–3.5 mm., throat 0.5–2 mm., lobes 1–1.5 mm., acute or 3-toothed, usually colored with a diffused purple streak from throat to tip of each lobe; stamens inserted in sinuses of corolla-lobes, almost sessile to 1 mm. long, shorter than corolla-lobes; style included; stigma 0.5 mm. or less; capsule oblong to ovoid, 3–5 mm. long; seeds many in each cell.

Transition Zone; eastern Washington and Oregon to Mono and Inyo Counties in California, east into Idaho, Utah, and Colorado, Nevada, and Arizona. Type locality: mountain valleys of Nevada and Utah. April–June.

Gilia leptomeria subsp. *micromeria* (A. Gray) Mason & Grant, Madroño 9: 214. 1948. (*Gilia micromeria* A. Gray, Proc. Amer. Acad. 8: 279. 1870.) Pedicels more slender than the species and often reflexed; corolla minute and the lobes entire or sometimes 3-toothed. Eastern Oregon eastward to the Rocky Mountains. Type locality: "Mountain valleys of Nevada and Utah." Collected by Watson.

Gilia leptomeria subsp. *rubella* (Brand) Mason & Grant, loc. cit. (*Gilia arenaria* subsp. *leptantha* var. *rubella* Brand, Pflanzenreich 4²⁵⁰: 103. 1907; *Gilia Hutchinsifolia* Rydb. Bull. Torrey Club 40: 472. 1913.) Basal leaves more deeply cut than is usual in the species, and often bipinnate, the secondary lobes short and rounded; cauline leaves linear, the lower sometimes toothed, the upper long, narrow, and entire; corolla 7–12.7 mm. long, tube 3.7–7 mm. long, pale violet or white, throat 1.3–3 mm. long, yellow or with a ring of violet spots, lobes 2–5 mm. long, violet or white. Red Rock Canyon, Kern County, California, Inyo County to southern Nevada, Utah, and northeastern Arizona. Type locality: St. George, Utah.

22. *Gilia leptalea* Greene. Bridges' Gilia. Fig. 4032.

Collomia leptalea A. Gray, Proc. Amer. Acad. 8: 261. 1870.

Gilia leptalea Greene, Erythra 4: 58. 1896.

Gilia leptalea subsp. *eu-leptalea* Brand, Pflanzenreich 4²⁵⁰: 97. 1907.

Gilia lineata Davidson, Bull. S. Calif. Acad. 22: 71. 1923.

Erect annual, 3–40 cm. high; stems paniculately branched, glabrous to puberulent and viscid glandular. Leaves linear to lanceolate, entire to pinnately dissected or lacinately lobed, 1–4 cm. long, the upper much-reduced and bracteate; inflorescence an open panicle with flowers on

slender pedicels; sepals linear, flanked by a membrane which is united below to form a pseudotube one-half the length of calyx, glabrous to glandular-viscid; corolla narrowly to broadly funnel-form, 7–20 mm. long, lobes pink, throat pink, purple, brownish or yellow, often spotted, tube white or yellow; stamens unequal, unequally inserted, some in the sinus, others about half way on the tube; stigma exserted; capsule ellipsoidal, exceeding calyx-tube; seeds 3–4 in each locule.

Gravelly borders of meadows, Transition Zone; North Coast Ranges from Humboldt County to Lake County, Santa Barbara County; Sierra Nevada from eastern Siskiyou County to Tulare County, California. Type locality: "California in the Sierra and foothills, from Plumas to Mariposa County." June–Sept.

Gilia leptalea subsp. *pinnatisecta* Mason & Grant, *Madroño* 9: 220. 1948. Similar to the species but the leaves pinnately to lacinately lobed or dissected, and the whole plant often glandular-viscid. North Coast Ranges, Lake County to Humboldt County, California; San Marcos, *Brandegee* (Santa Barbara County?). Type locality: "Whispering Pines resort, Lake County, California."

Gilia leptalea subsp. *bicolor* Mason & Grant, *Madroño* 9: 220. 1948. Similar to the species, but the throat subequal the tube and yellow. Canadian Zone; central Sierra Nevada, California. Type locality: Dardanelle, Tuolumne County.

23. *Gilia minutiflora* Benth. Small-flowered *Gilia*. Fig. 4033.

Gilia minutiflora Benth. in A. DC. *Prod.* 9: 315. 1845.

Gilia sinistra Jones, *Contr. West. Bot.* No. 10: 57. 1902, as *G. sinister*.

Erect annual 1–5 dm. high, stems much-branched, minutely pubescent. Leaves linear filiform, entire, 1–3 cm. long, puberulent; inflorescence paniculate, glandular-puberulent, flowers on short pedicels; calyx 2–3 mm. long, lobes lanceolate, flanked by a membranous margin below, which unites abruptly to form a pseudotube; corolla salverform, 6–8 mm. long, white to pink or lavender, tube 4–5 mm. long, lobes 2–3 mm. long; stamens inserted on upper part of tube, barely exserted from throat; pistil included; capsule ellipsoidal; seeds several in each locule.

Upper Sonoran Zone; eastern Washington and Oregon. Type locality: Northwest America. May–Aug.

24. *Gilia capillaris* Kell. Smooth-leaved *Gilia*. Fig. 4034.

Gilia capillaris Kell. *Proc. Calif. Acad.* 5: 46. 1873.

Navarretia capillaris Kuntze, *Rev. Gen. Pl.* 2: 433. 1891.

Gilia linearifolia Howell, *Fl. N.W. Amer.* 461. 1903.

Gilia columbiana Piper ex Brand, *Pflanzenreich* 4²⁵⁰: 98, as a synonym. 1907.

Gilia leptalea subsp. *capillaris* Brand, loc. cit.

Gilia subalpina Greene ex Brand, loc. cit.

Slender, erect annual, 2–30 cm. tall, stems simple or branched, glandular-puberulent. Leaves sessile, linear to slightly arcuate, rarely lanceolate, rarely lobed at the base, 1–2 cm. long; inflorescence a cymose panicle with bracts opposite the flowers; flowers on slender pedicels, rarely sessile; calyx 2–3 mm. long, sepals linear-lanceolate, flanked by sinus-membrane which is joined to form a pseudotube about equal the lobes in length, glandular-puberulent; corolla narrowly funnelform, 5–10 mm. long, one and one-half to two and one-half times the calyx, pink to white, tube 2–3 mm. long, throat very narrow, 3–4 mm. long, lobes 1–1.5 mm. long; stamens inserted in sinuses on short filaments, anthers blue or white; pistil included, stigma 0.5 mm. long; capsule ellipsoidal, 3–4 mm. long, seeds 3 to 4 in each locule.

Hudsonian and Canadian Zones; southern Oregon, Josephine County to Harney County, and southward in California to Mendocino and Trinity Counties and the Sierra Nevada. Type locality: Cisco, Placer County, California. June–Sept.

25. *Gilia tenerrima* A. Gray. Delicate *Gilia*. Fig. 4035.

Gilia tenerrima A. Gray, *Proc. Amer. Acad.* 8: 277. 1870.

Erect annual, simple or much-branched, from minutely glandular-pubescent to glabrous. Leaves simple, alternate, linear-oblancheolate, 8–12 mm. long, sparsely glandular with tack-like hairs; inflorescence paniculate, pedicels often divaricately spreading; sepals with sinus membrane in lower two-thirds of calyx joined to form a pseudotube; corolla funnelform, 1–2 mm. long, tube and throat included in calyx, white to pale pink or pale blue; stamens inserted on throat, exserted; capsule globose, subequal the calyx, seeds 1 or 2 to a locule.

Transition and Canadian Zones; Malheur and Harney Counties, eastern Oregon, to Nevada and Utah. Type locality: on hills above Bear River, Evanston, Utah. May–June.

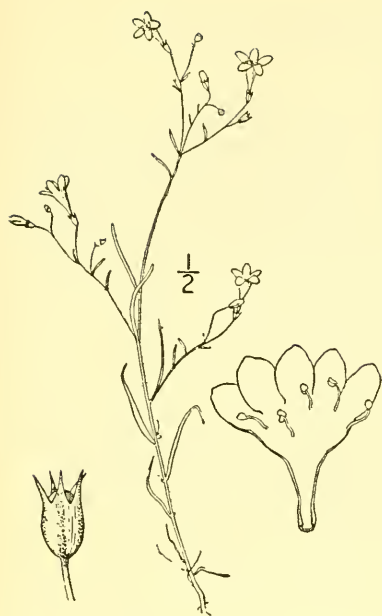
26. *Gilia filiformis* Parry. Thread-stemmed *Gilia*. Fig. 4036.

Gilia filiformis Parry ex A. Gray, *Proc. Amer. Acad.* 10: 75. 1874.

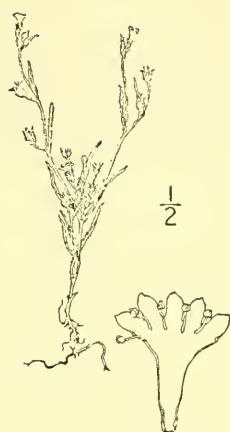
Tintinabulum filiforme Rydb. *Fl. Rocky Mts.* 698. 1917.

Erect annual, 3–15 cm. high; stem simple below, branched above, glabrous. Leaves alternate, rarely the lower opposite, simple, entire, linear, almost filiform, 1–5 cm. long; flowers solitary, each opposite a leaf, pedicels slender, 6–12 mm. long; calyx deeply cut, the sepals flanked by a hyaline membrane which joins below to form a pseudotube; corolla campanulate, yellow, 4–6 mm long, tube obsolete, throat 1–2 mm. long, lobes 3–4 mm. long, oblong; stamens equal, inserted on base of throat, 2 mm. long, extending beyond throat; pistil exserted; capsule subequal the calyx, ovoid; seeds several in each locule.

Sandy and gravelly soils, Lower Sonoran Zone; Mojave Desert from Inyo and San Bernardino Counties, California, east to Utah and Arizona. Type locality: Rocky slopes near St. George, Utah. March–May.



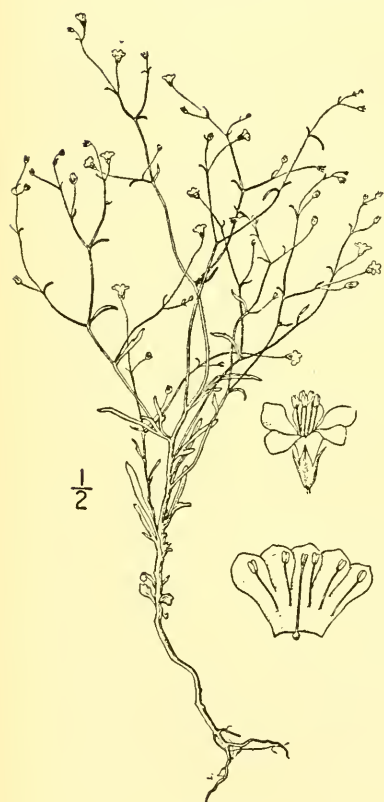
4032



4034



4033



4035



4037

4032. *Gilia leptalea*
4033. *Gilia minutiflora*

4034. *Gilia capillaris*
4035. *Gilia tenerrima*

4036. *Gilia filiformis*
4037. *Gilia inyoensis*

27. *Gilia inyoensis* I. M. Johnston. Inyo *Gilia*. Fig. 4037.*Gilia inyoensis* I. M. Johnston, Contr. Gray Herb. No. 75: 39. 1925.*Gilia campanulata* var. *breviuscula* Jepson, Man. Fl. Pl. Calif. 799. 1925.*Gilia inyoensis* var. *breviuscula* Jepson, Fl. Calif. 3: 194. 1943.

Annual, 3–10 cm. high, stems spreading from base, glabrous to sparsely stipitate-glandular. Leaves oblanceolate, 3–8 mm. long, entire to somewhat coarsely toothed, becoming bracteate and recurved in the inflorescence; flowers solitary, on slender pedicels in axils of bracts; sepals linear-lanceolate, with a membranous margin below which unites to form a pseudotube; corolla broadly funnelform, 3–6 mm. long, lobes ovate, obtuse, white, throat yellow, 2–2.5 mm. long; stamens equal, inserted on middle of throat, 2 mm. long; capsule ellipsoidal; seeds numerous in each locule.

Upper Sonoran Zone; east slope of Sierra Nevada, western Inyo County, California. Type locality: foothills west of Bishop. April–May.

28. *Gilia campanulata* A. Gray. Bell-flowered *Gilia*. Fig. 4038.*Gilia campanulata* A. Gray, Proc. Amer. Acad. 8: 279. 1870.*Navarretia campanulata* Kuntze, Rev. Gen. Pl. 2: 433. 1891.

Spreading annual, 2–15 cm. tall, stems sparsely glandular-puberulent. Leaves lanceolate to linear, 6–15 mm. long, entire or with a few teeth; flowers solitary on slender pedicels, each opposite a leaf and often shorter than the leaf; calyx deeply cleft, the lobes linear-lanceolate, the lower one-half to two-thirds flanked by a hyaline membrane which unites below to form a pseudotube; corolla funnelform to narrowly campanulate, 5–10 mm. long, the tube very short, 0.5–1 mm. long, throat, 5–7 mm. long, lobes 2–4 mm. long, white with yellow throat; stamens inserted at base of corolla, unequal; capsule ovoid; seeds several in each locule.

Sandy soil, Upper Sonoran Zone; Inyo County, California, to southern Nevada. Type locality: foothills of Trinity Mountains, Nevada. April–May.

Family 129. FOUQUIERIACEAE.

FOUQUIERIA FAMILY.

Spiny branched shrubs or small trees, or in *Idria* with a simple columnar trunk. Leaves alternate on the end of elongated petioles that soon develop into stout spines, secondary leaves fasciated in the axils of the spines. Flowers showy, in terminal panicles. Sepals 5, imbricated, persistent. Corolla sympetalous, tubular, 5-lobed. Stamens 10–15, attached to the base of the corolla-tube; filaments thickened at base. Ovary solitary, imperfectly 3-celled by the protruding placentae. Ovules few, usually 3–6. Fruit a 3-valved capsule. Seeds winged or the angles fringed with hairs.

A unique family comprising 2 closely related genera, the following and *Idria* with one species, *Idria columnaris* Kell. of Lower California. The botanical relationship of the family is not clear. In the Botany of California Sereno Watson (1876) placed the genus *Fouquieria* in the family Tamaricaceae with this comment: "Its characters are anomalous, and it has been placed by different authorities in the orders [families] *Polemoniaceae*, *Frankeniaceae*, *Portulacaceae*, and *Cassiniaceae*, and taken for a distinct order *Fouquieriaceae*." At the present time it is generally accepted as a distinct family, some authors placing it in the choripetalous order *Parietales* near the *Tamaricaceae* and others (Diels, in Engler's *Syllabus der Pflanzenfamilien*, 1936) in the sympetalous order *Tubiflorae* near the families *Convolvulaceae* and *Polemoniaceae*.

1. *FOUQUIERIA* H.B.K. Nov. Gen. & Sp. 6: 81. pl. 527. 1823.

Characters of the family. [Named in honor of P. E. Fouquier, Parisian professor of medicine.]

A Mexican genus of about 7 species, one extending northward into the desert regions of southwestern United States. Type species, *Fouquieria formosa* H.B.K.

1. *Fouquieria splendens* Engelm. Ocotillo. Fig. 4039.*Fouquieria splendens* Engelm. in Wislitz. Mem. Tour North Mexico. 98. 1848.

Shrub with several slender simple stems arising from a common root crown, 2.5–6 mm. high, strongly grooved and ridged by the decurrent bases of the stiff spreading spines, bark light grayish. Primary leaves spatulate to obovate, 2–3 cm. long, entire, early deciduous, their petioles persistent and developing into the spines, 1–2 cm. long; secondary leaves in the axils of the spines, smaller; inflorescence a terminal racemose panicle, 5–25 cm. long; pedicels 4–8 mm. long; sepals scarious, suborbicular, 6–8 mm. long; corolla scarlet, tube 1.5–2 cm. long, about 5 mm. broad, lobes rounded recurved, 5–7 mm. long; capsule 10–14 mm. long, 3-valved, persistent; seeds copiously fringed with long whitish hairs.

Sloping alluvial mesas (bajadas) of the deserts, Lower Sonoran Zone; Colorado Desert, southern California, to southwestern Texas, south to northern Mexico from Lower California to Coahuila and Zacatecas. Type locality: Jornada del Muerto, New Mexico. March–May.

Family 130. **LENNOACEAE.****LENNOA FAMILY.**

Fleshy brownish herbs without chlorophyll, parasitic on roots, leaves reduced to bract-like scales. Flowers perfect, in densely flowered spikes or heads. Calyx deeply parted into nearly distinct narrowly linear segments. Corolla sympetalous, tubular, the limb 5–8-lobed. Stamens as many as the lobes of the corolla, inserted on the throat alternating with the lobes; anthers 2-celled, dehiscent by longitudinal slits. Pistil 1, composed of 6–14 completely united carpels; style 1, simple; stigma subcapitate or peltate, crenate; ovary divided by dorsal false partitions into twice as many cells as carpels with one ovule in each cell. Fruit a drupaceous capsule, tardily and irregularly circumscissile, breaking up into 12–28 nutlets. Seed with endosperm and a globular embryo not differentiated into caudicle and cotyledon.

A genus of 3 genera and 5 species. Besides the following, the genus *Lennoa*, with 2 species, inhabits Mexico. The *Lennoaceae* is an anomalous group of plants, often placed in the *Ericales*, but other than the parasitic habit of the *Monotropaceae*, it has little or no morphological affinities with that group. Diels (Engler, Syllabus der Pflanzenfamilien, 1936) has placed it in a suborder of the *Tubiflorae*, between the suborder *Convolvuloideae* and the suborder *Borragininae*. The character and position of the stamens would indicate that this is a more natural classification.

Flowers in a dense terminal spike; sepals puberulent.
Flowers on a terminal peltate disk; sepals plumose.

1. *Pholisma*.
2. *Ammobroma*.

1. **PHOLÍSMÁ** Nutt. ex Hook. Ic. Pl. *pl.* 626. 1844.

Fleshy parasitic herb with scale-like leaves. Flowers in a simple or completely branched spike without bracts, perfect. Calyx parted into 5–7 narrowly linear lobes. Corolla nearly regular, narrowly funnelform, with 5–7, rounded, prickly imbricate lobes. Stamens as many as the corolla-lobes, and adnate to above the middle of the corolla-tube. Ovary subglobose, 6–10-celled with each cell divided into two by a dorsal false partition. Stigma crenately 6–10-lobed. Fruit subglobose, remaining within the persistent corolla, very tardily breaking up. [Name Greek, meaning scale, referring to the scale-like leaves on the stem.]

A monotypic genus of California and Lower California.

1. **Pholisma arenarium** Nutt. *Pholisma*. Fig. 4040.

Pholisma arenarium Nutt. ex Hook. Ic. Pl. *pl.* 626. 1844.

Lennoa arenaria Fourn. Bull. Soc. Bot. Fr. 16: 11. 1869.

Pholisma depressum Greene, Bull. Calif. Acad. 1: 198. 1885.

Pholisma paniculatum Templeton, Bull. S. Calif. Acad. 37: 98. *pl.* 25, 26. 1939.

Brownish fleshy plant, the portion above ground glandular-puberulent and often well-sprinkled with adhering grains of sand, 1–2 dm. high. Bracts of the stem lanceolate, 8–15 mm. long; spike simple or compactly branched, 2.5–8 cm. thick; calyx-lobes linear or narrowly clavate, shorter than the corolla, glandular-puberulent; corolla purple except the white margins of the lobes, funnelform, the limb spreading, 3–4 mm. broad; the lobes rounded, emarginate and more or less sinuate.

Usually in sandy soil, parasitic on the roots of various shrubs, such as *Chrysothamnus*, *Ericameria*, *Hymenoclea*, *Eriodictyon*, Sonoran Zones; sandy soils along the coast from San Luis Obispo County to San Diego; also in the Mojave and Colorado Deserts, California, extending into northern Lower California. Type locality: San Diego. April–July.

2. **AMMOBRÔMA** Torr. ex A. Gray, Mem. Amer. Acad. II. 5: 327. 1854.

Fleshy plants without chlorophyll, parasitic on roots. Stems simple, mostly buried in the sand, scaly, expanded at the summit into a broad saucer-shaped disk, bearing the small bractless flowers. Calyx-lobes 6–9, distinct to the base, linear-filiform, plumose. Corolla nearly tubular, the lobes 6–9, mostly 6, erect, plicate. Stamens 6–9, alternate with the corolla-lobes, adnate to the corolla up to the throat, the free portions of the filament very short. Ovary of 6–10 carpels by false partitions, 12–20-celled; style simple; stigma subcapitate, crenate on the margin. Fruit globose, the endocarp chartaceous, separating readily from the fleshy exocarp; nutlets 12–20. [Name from two Greek words, meaning sand and food.]

A monotypic genus of the Sonoran Desert region.

1. **Ammobroma sondrae** Torr. Sand Food. Fig. 4041.

Ammobroma sondrae Torr. ex A. Gray, Mem. Amer. Acad. II. 5: 327. 1854.

Fleshy root-parasite, growing in sand and often buried in it almost up to the expanded saucer-shaped disk forming the inflorescence. Stem 1–2 cm. thick, clothed with appressed linear

scales, the lower ones glabrous brownish purple, those just below the disk woolly-villous and narrower; disk of inflorescence 3-12 cm. in diameter, the whole upper surface densely covered with flowers, the woolly-villous hairs of the calyx giving the whole surface a sandy-gray color; flowers in the center of the depressed disk with longer pedicels, those in the rim sessile, giving a plane upper surface and suggesting a mushroom; corolla purple, about 8 mm. long, tubular, including the short erect rounded lobes, equaling the densely woolly calyx-lobes and appearing as if imbedded in wool.

Parasitic on the roots of desert shrubs, growing in sandy soil, Lower Sonoran Zone; Colorado Desert in southeastern California and southwestern Arizona, to northern Lower California and Sonora. Type locality: Adair Bay, Sonora. This species is rarely collected in California. May.

Family 131. HYDROPHYLLACEAE.*

WATERLEAF FAMILY.

Perennial, biennial, or annual herbs, or shrubs, with alternate or opposite and frequently divided or compound leaves, and cymose or solitary flowers. Calyx-lobes usually 5, similar or dissimilar, with or without auricles, often accrescent in fruit. Corolla-lobes usually 5, nearly equal, longer or shorter than the corolla-tube, usually with a pair of scales at the base of each filament. Stamens usually 5, hypogynous, exserted or included. Pistil 1, compound, consisting of 2 united carpels; style generally deciduous, deeply 2-parted to entire; stigmas 2, capitate (rarely subulate). Fruit a loculicidal capsule dehiscent by 2 valves, or both loculicidal and septicidal and dehiscent by 4 valves, or irregularly dehiscent; capsule 1-celled or partially 2-celled by the intrusion of the parietal placentae. Ovules few to very numerous; seeds one to more than 100. Endosperm present; cotyledons 2, entire.

A family of about 25 genera and 250 to 300 species, chiefly of western North America.

Ovary strictly unilocular, nearly filled by the young placentae, these forming a lining for the capsule.

Perennial; leaves chiefly basal and all alternate; flowers numerous in congested cymes; stamens conspicuously exserted. 1. *Hydrophyllum*.

Annual; leaves chiefly cauline, at least the lowest opposite; stamens included.

Herbage pubescent, prickly, or glabrate, neither viscid nor scented; ovules borne only on the front of the placentae.

Succulent, scandent herbs with prickly stems; flowers several in terminal cymes; capsules prickly or bristly; seeds nearly globose, reticulate or alveolate; cucullus lacking. 2. *Pholistoma*.

Weak, flaccid herbs with pubescent or glabrate (rarely minutely prickly) stems; flowers solitary, usually in the leaf-axils; capsules pubescent, unarmed; seeds usually ovoid, smooth, tuberculate, or pitted; cucullus present. 3. *Nemophila*.

Herbage viscid and scented; ovules borne on both faces of the placentae.

4. *Eucrypta*.

Ovary partially or completely divided by the intrusion of the narrow parietal placentae.

Style lobed, cleft, or divided; plants neither bulbous nor with woolly tubers at the base.

Calyx-lobes similar, or if differing in size and shape, the plants annual and usually with toothed or divided leaves.

Usually caulescent; flowers in terminal, usually scorpioid cymes, or solitary in the axils of the cauline leaves; capsule either loculicidal, or both loculicidal and septicidal.

Stamens equally inserted, and if unequal in length the seeds strongly corrugated.

Corolla blue or violet to white, deciduous, or if marcescent the seeds not transversely corrugated. 5. *Phacelia*.

Corolla yellow, withering-persistent and enclosing the mature capsule.

Pedicels usually shorter than the erect flowers; seeds usually terete, transversely corrugated. 6. *Mititizia*.

Pedicels equaling or longer than the pendulous flowers; seeds flattened, reticulate.

7. *Emmenanthe*.

Stamens unequal or/and unequally inserted.

Leaves all opposite.

8. *Draperia*.

Leaves all alternate, or rarely a few opposite.

Corolla constricted at the insertion of the stamens, the filaments coherent laterally by their dilated bases. 9. *Lemmonia*.

Corolla not constricted at the point of stamen-insertion, the stamens distinct.

Annual or perennial herbs, sometimes woody at base; leaves herbaceous; capsule membranaceous or only semi-cartilaginous; seeds usually 6 to numerous.

Flowers solitary, or few in reduced cymes; seeds usually reticulate, and sometimes shallowly pitted. 10. *Nama*.

Flowers numerous in a thyrsoid panicle of cymes; seeds longitudinally striate. 11. *Turricula*.

Stout shrubs, woody throughout; leaves coriaceous; capsule cartilaginous; seeds usually 2-8. 12. *Eriodictyon*.

Acaulescent; flowers usually solitary in the leaf-axils of a basal rosette; capsule septicidal.

13. *Hesperochiron*.

Calyx-lobes dimorphic, the outer conspicuously enlarged, cordate, and strongly venose in fruit, the inner lobes linear; plants perennial with entire leaves.

14. *Tricardia*.

Style entire; plants bulbous or tuberous at base; leaves simple, reniform.

15. *Romanzoffia*.

* Text contributed by Lincoln Constance.



4038. *Gilia campanulata*
4039. *Fouquieria splendens*
4040. *Pholisma arenarium*

4041. *Ammobroma sonora*
4042. *Hydrophyllum tenuipes*

4043. *Hydrophyllum Fendleri*
4044. *Hydrophyllum occidentale*

1. *HYDROPHYLLUM* L. Sp. Pl. 146. 1753.

Erect, pubescent or glabrate perennial (in ours) herbs from horizontal rootstocks, bearing fleshy-fibrous or tuberous roots. Leaves basal and alternate, pinnately divided to pinnatifid, the cauline lobed or divided, petiolate. Flowers several to many in terminal, open to capitate cymes, pedicellate. Calyx divided nearly to the base, the lobes subequal, the sinuses naked in ours. Corolla greenish or white to purple or violet, or white and marked with violet, deciduous, campanulate to subpelviform, divided to the middle or below, longer than the calyx. Stamens exserted, equal and equally inserted on the corolla; appendages linear, a pair bordering each filament, one edge free, ciliate. Style exserted, shallowly bifid. Mature capsule membranaceous, unilocular, loculicidally dehiscent. Ovules a pair on the front of each of the two large parietal placentae. Seeds 1-3, subglobose, brown, reticulate. [Name Greek, meaning water and leaf.]

A genus of 8 species of the eastern and western United States and adjacent Canada. Type species, *Hydrophyllum virginianum* L.

Plants usually tall; rhizome conspicuous, often scaly, bearing fleshy-fibrous roots; anthers linear-oblong, 1-2 mm. long; leaflets variously cut to entire, but usually toothed on the lower edge.

Leaves ovate to suborbicular, pinnately divided to somewhat pinnatifid, the leaflets usually 5, occasionally 7-9; cymes lax in flower, the pedicels 3-12 mm. long.

Leaves oblong to oblong-oval, pinnatifid, the leaflets 7-19; cymes subcapitate in flower, the pedicels 2-8 mm. long.

Leaflets acuminate, the teeth usually 8-12, acuminate; cymes lax in fruit.

Leaflets obtuse to abruptly acute, the teeth usually 3-6, obtuse to acute; cymes compact in fruit.

Plants usually low; rhizome very short, bearing a fascicle of fleshy, finger-like roots; anthers short-oblong, 0.6-1 mm. long; leaflets entire or toothed, incised, or divided only at apex, not toothed on the lower edge.

4. *H. capitatum*.

1. *Hydrophyllum tenuipes* Heller. Pacific Waterleaf. Fig. 4042.

Hydrophyllum tenuipes Heller, Bull. Torrey Club 25: 582. 1898.

Hydrophyllum tenuipes var. *viride* Jepson, Man. Fl. Pl. Calif. 811. 1925.

Hydrophyllum viridulum G. N. Jones, Univ. Wash. Pub. Biol. 7: 175. 1939.

Plants 2-6 dm. tall, the stems retrorse-hispid, the rhizome bearing fleshy-fibrous roots. Leaves semi-orbicular, 8-20 cm. in diameter, pinnately divided, the principal divisions 5, ovate-lanceolate to ovate, 5-10 cm. long, the lowest pair usually distinct and often 2-parted, or all confluent, the terminal 3-cleft, all coarsely serrate or incised with ovate lobes, sparsely strigose on both surfaces; cymes several, open, the pedicels 5-12 mm. long; calyx-lobes linear to linear-subulate, 4-7 mm. long, 0.5-1 mm. broad, strigulose to glabrate on the back, hispid-ciliate; corolla cream, greenish, purple, or blue, 5-7 mm. long, the lobes oblong, 3-4 mm. long; style exserted 5-10 mm.; capsule 3-5 mm. in diameter; seeds 1, yellowish to reddish brown, about 3.5 mm. in diameter.

Moist, shaded ground, Humid Transition Zone; Vancouver Island and northern Washington, west of the Cascade Range, to Mendocino County, California. Type locality: along the Chehalis River at Montesano, Washington. April-June.

2. *Hydrophyllum Fendleri* (A. Gray) Heller. Fendler Waterleaf. Fig. 4043.

Hydrophyllum occidentale var. *Fendleri* A. Gray, Proc. Amer. Acad. 10: 314. 1875.

Hydrophyllum Fendleri Heller, Plant World 1: 23. 1897.

Plants 2.5-9 dm. tall, the stems retrorse-hispid, the rhizome bearing fleshy-fibrous roots. Leaves oblong to oval, 6-30 cm. long, 5-20 cm. broad, pinnatifid, the principal divisions usually 9-13, ovate to lanceolate, acuminate, 2-12 cm. long, the lower pairs usually distinct, the upper confluent, all coarsely serrate to incised with ovate-lanceolate lobes, strigose on both surfaces; cymes one to several, open, the pedicels 2-6 mm. long; calyx-lobes linear-lanceolate, 4-6 mm. long, 1-2 mm. broad, sparsely strigose and often hispid on the back, ciliate with flattened hyaline hairs, nearly equaling the corolla; corolla white or violet, or white and marked with violet, 6-8 mm. long, the lobes 3-4 mm. long; style exserted 5-7 mm.; capsule about 4 mm. in diameter; seeds 1-3, light brown, 2.5-3 mm. in diameter.

Moist, shaded ground, Transition and Boreal Zones; southeastern Washington, northeastern Oregon, and adjacent Idaho; east to the Rocky Mountains from Wyoming to New Mexico. Type locality: Santa Fe Creek, New Mexico. May-July.

Hydrophyllum Fendleri var. *albifrons* (Heller) J. F. Macbride, Contr. Gray Herb. No. 49: 23. 1917. (*Hydrophyllum albifrons* Heller, Bull. Torrey Club 25: 267. 1898; *H. congestum* Wiegand, Bull. Torrey Club 26: 136. 1899.) Stems, peduncles, petioles, and pedicels hirsutulous; leaves paler beneath with short, soft hairs; calyx-lobes 3-5 mm. long, strigulose with soft hairs on the back, weakly ciliate, much shorter than the corolla; corolla 7-10 mm. long. Cascade Range, from northern California to British Columbia; Olympic Mountains; southeastern Washington and northeastern Oregon to adjacent Idaho. Type locality: Lake Waha, Nez Perce County, Idaho.

3. *Hydrophyllum occidentale* (S. Wats.) A. Gray. California Waterleaf. Fig. 4044.

Hydrophyllum macrophyllum var. *occidentale* S. Wats. Bot. King Expl. 248. 1871.

Hydrophyllum occidentale A. Gray, Proc. Amer. Acad. 10: 314. 1875.

Hydrophyllum Watsonii Rydb. Bull. Torrey Club 40: 478. 1913.

Plants 1-6 dm. tall, the stems densely short-pubescent to somewhat retrorse-hispid, the

rhizome bearing fleshy-fibrous roots. Leaves oblong, 3–30 cm. long, 3–15 cm. broad, pinnatifid, the principal divisions 7–15, broadly oblong to ovate, 1.5–7 cm. long, all incised or lobed (rarely entire) with ovate lobes, strigulose above, paler beneath with dense, fine, subappressed hairs; cymes one to several, globose, the pedicels 2–5 mm. long; calyx-lobes narrowly lanceolate, 3–4 mm. long, 1–2 mm. broad, strigulose on the back, hispid-ciliate; corolla violet to white, 7–10 mm. long, the lobes 4–6 mm. long, oblong; style exserted 5–8 mm.; capsule about 4 mm. in diameter; seeds 1–2, brown, about 3 mm. in diameter.

Moist soil in oak or coniferous woods, Transition and Boreal Zones; western Oregon to central California in the Coast Ranges, and in the Cascades and Sierra Nevada to the Tehachapi Range, eastward to Idaho, Nevada, Utah, and Arizona. Type locality: California. May–July.

4. *Hydrophyllum capitatum* Dougl. Woollen-breeches. Fig. 4045.

Hydrophyllum capitatum Dougl. ex Benth. Trans. Linn. Soc. 17: 273. 1835.

Plants 1–4.5 dm. tall, the stems very short, spreading-hirsutulous, the short rhizome bearing a fascicle of fleshy-tuberous, finger-like roots. Leaves ovate to oval, 5–12 cm. long, 3–12 cm. broad, pinnately parted or divided, the principal divisions 5–7, obovate to oblong or lanceolate, 2–5 cm. long, the lower pair distinct, the upper or all confluent, the larger cleft or divided into oblong, entire lobes, appressed-hirsutulous; cymes one to several, globose, the peduncles 1–5 cm. long, conspicuously shorter than the leaves, the pedicels 2–5 mm. long; calyx-lobes linear-oblong, 3–4 mm. long, 0.5–1.5 mm. broad, densely appressed-hirsutulous on the back, ciliate with flattened hairs; corolla purplish blue to white, 5–9 mm. long, the lobes oblong-obovate, 3–5 mm. long; style exserted 5–10 mm.; capsule about 4 mm. long; seeds usually 2, light brown, 2–3 mm. in diameter.

Moist soil in sagebrush or coniferous woods, Upper Sonoran Zone to the Boreal Zones; mountains, central and eastern Washington and Oregon to British Columbia, Alberta, and Colorado. Type locality: "in the interior of Columbia in North-west America." May–July.

Hydrophyllum capitatum var. *Thompsonii* (M. E. Peck) Constance, Amer. Midl. Nat. 27: 726. 1942. (*Hydrophyllum Thompsonii* M. E. Peck, Torreya 28: 55. 1928.) Cymes globose even in fruit, the peduncles 5–20 cm. long, conspicuously exceeding the leaves; filaments sparsely villous to nearly glabrate. Columbia River gorge and vicinity in central Washington and Oregon. Type locality: Multnomah Falls, Multnomah County, Oregon.

Hydrophyllum capitatum var. *alpinum* S. Wats. Bot. King Expl. 249. 1871. (*Hydrophyllum alpestre* Nels. & Kenn. Muhlenbergia 3: 142. 1908.) Nearly acaulescent, with abundant, spreading pubescence; cymes borne near the ground, much shorter than the leaves, open at least in fruit, the peduncles 1–5 cm. long, the pedicels 5–20 mm. long, spreading or reflexed. Northern Great Basin, northeastern California and southwestern Oregon to Idaho, Nevada, and Utah. Type locality: "East Humboldt Mts., Nevada."

2. PHOLISTOMA Lilja ex Lindbl. Bot. Notiser 40. 1839.

Prostrate or reclining, succulent, annual herbs, the stems brittle, angled, and the angles prickly. Lower leaves opposite, the upper alternate, pinnately divided, petiolate, the petioles often winged and clasping. Flowers solitary in the axils and several in open, terminal cymes, pedicellate. Calyx divided nearly to the base, the sinuses armed with a sepaloïd auricle, or naked. Corolla white, blue, or violet, deciduous, pelviform to sub-rotate, lobed about to the middle, longer than the calyx. Stamens included, equal and equally inserted on the corolla; appendages broad and triangular to minute or reduced to glands, a pair to each filament. Style cleft less than one-half. Mature capsule unilocular, globose, exceeded by the enveloping or stellate-spreading, accrescent calyx, loculicidally dehiscent. Ovules 2 to several on the front of each of the two large parital placentae. Seeds usually 1–6, globose, light brown, regularly alveolate or reticulate. [Name Greek, meaning scale and mouth.]

A genus of 3 species of the southwestern United States and adjacent Mexico. Type species, *Nemophila aurita* Lindl.

Foliage green; calyx with conspicuous auricles, enveloping the mature capsule; capsule 5–10 mm. in diameter.

Cauline leaves auriculate-clasping; corolla-scales broad and conspicuous. 1. *P. auritum*.

Cauline leaves with narrowly winged but only slightly connate petioles; corolla-scales narrow and inconspicuous. 2. *P. racemosum*.

Foliage glaucous; calyx without auricles, stellate-rotate under the mature capsule; capsule 2–4 mm. in diameter. 3. *P. membranaceum*.

1. *Pholistoma auritum* (Lindl.) Lilja. Common Fiesta-flower. Fig. 4046.

Nemophila aurita Lindl. Bot. Reg. 19: pl. 1601. 1833.

Pholistoma auritum Lilja ex Lindbl. Bot. Notiser 40. 1839.

Ellisia aurita Jepson, Fl. Calif. 3: 236. 1943.

Stems 2–12 dm. long, sparingly hispidulous. Lower leaves oblong to ovate-lanceolate, 8–15 cm. long, 2–8 cm. broad, acuminate at apex, cordate at base, the divisions 7–13, oblong or lanceolate, falcate or retrorse, hispidulous on both surfaces, the petioles broadly winged and auriculate-clasping; flowers solitary, or 2–6 in cymes; calyx-lobes lanceolate or ovate-lanceolate, 4–8 mm. long, 2–2.5 mm. broad, the auricles 1–2 mm. long; corolla 1–3 cm. broad, lavender to blue or violet with darker markings, the lobes oval to obovate, the tube paler, coarctate at the throat; appendages purple, triangular, the free edge often fimbriate, the yellow nectaries conspicuous; style about 5 mm. long; capsule 5–10 mm. in diameter, enclosed by the calyx; seeds 1–4, 2–3 mm. in diameter.

Moist woods and canyons, Upper Sonoran and Arid Transition Zones; Coast Ranges, Sierra Nevada foothills, and Santa Barbara Islands of California. Type locality: California. March–June.

Pholistoma auritum var. *arizonicum* (M. E. Jones) Constance, Bull. Torrey Club 66: 348. 1939. (*Nemophila arizonica* M. E. Jones, Contr. West. Bot. No. 12: 50. 1908.) Smaller and more slender, less prickly throughout; leaf-divisions fewer, blunt; corolla usually less than 1 cm. broad, about equaling the calyx. Mountains of southeastern California to Arizona. Type locality: "Chimihuevis Mountains, Arizona."

2. *Pholistoma racemosum* (Nutt.) Constance. San Diego Fiesta-flower. Fig. 4047.

Nemophila racemosa Nutt. ex A. Gray, Proc. Amer. Acad. 10: 315. 1875.

Nemophila erodifolia Millsp. in Millsp. & Nutt. Field Mus. Bot. Ser. 5: 205. 1923.

Pholistoma racemosum Constance, Bull. Torrey Club 66: 349. 1939.

Ellisia racemosa Jepson, Fl. Calif. 3: 237. 1943.

Stems 3–6 dm. long, sparingly hispidulous. Lower leaves ovate or deltoid-ovate, 4–10 cm. long, 2–6 cm. broad, obtuse at apex, subcordate or truncate at base, the divisions 5–9, oblong or ovate, more or less hispidulous on both surfaces, more densely so beneath, the petioles narrowly winged, but not auriculate; flowers solitary, or usually 2–6 in cymes; calyx-lobes linear- or ovate-lanceolate, 2–3 mm. long, 1–1.5 mm. broad, the auricles 1–1.5 mm. long; corolla 0.6–1 cm. broad, white or blue, the lobes obovate; appendages triangular but usually narrow or obsolete; style about 2.5 mm. long; capsule 5–8 mm. in diameter, enclosed by the calyx; seeds usually 4–6, sometimes 1, 1–2 mm. in diameter.

Moist, shaded places, Sonoran Zones; San Diego and Lower California coast, and Santa Cruz, San Clemente, Santa Catalina, and Mexican islands. Type locality: San Diego. Feb.–May.

3. *Pholistoma membranaceum* (Benth.) Constance. White Fiesta-flower. Fig. 4048.

Ellisia membranacea Benth. Trans. Linn. Soc. 17: 274. 1835.

Ellisia membranacea var. *hastifolia* Brand, Pflanzenreich 4^{2m}: 38. 1913.

Pholistoma membranaceum Constance, Bull. Torrey Club 66: 350. 1939.

Stems 0.5–6 dm. long, glabrous. Lower leaves oblong to oval, 3–12 cm. long, 1–5 cm. broad, obtuse at apex, subcordate or truncate at base, the divisions 5–11, oblong, obtuse, rather distant and entire or with a single tooth, sparsely hispidulous on both surfaces, the petioles more or less winged but not auriculate; flowers 2–10 in cymes, rarely solitary; calyx-lobes oval, 2–3 mm. long, 1–2 mm. broad, auricles none; corolla 0.4–1 cm. broad, white and often with a lanceolate purple spot on each lobe, the lobes oval; appendages triangular, very small; style 1.5–2 mm. long; capsule 2–4 mm. in diameter, the fruiting calyx stellate-spreading; seeds 1–2, 2–3 mm. in diameter.

Moist shade of oaks or bushes, Sonoran Zones; Coast Ranges and Sierra Nevada foothills of central California to the desert ranges of Inyo and San Bernardino Counties to southern Nevada and Lower California, absent from the islands and usually from the immediate coast. Type locality: California. March–June.

3. *NEMÓPHILA* Nutt. ex Barton, Fl. N. Amer. 2: 71. 1822; Journ. Acad. Phila. 2: 179. 1822. Nomen conservandum.

Delicate, weak, usually branched, hispid or glabrous annual herbs from slender tap-roots. Leaves all opposite, all alternate, or the lower opposite and the upper alternate, variously toothed, lobed, or pinnately divided, petiolate. Flowers solitary in the upper axils or opposite the leaves, pedicellate. Calyx divided nearly to the base, the sinuses armed with a sepaloïd auricle, or the auricles obsolete. Corolla white or blue, plain or variously marked, deciduous, campanulate to rotate, divided one-third to two-thirds, longer or shorter than the calyx. Stamens included, equal and equally inserted on the corolla; appendages a pair to each filament, adnate or partially free, ciliate to glabrous, or reduced to hairy lines or obsolete. Style shallowly to deeply bifid. Mature capsule unilocular, ovoid or globose, loculicidally dehiscent. Ovules two to several on the front of each of the two large parietal placentae. Seeds 1–20, ovoid, corrugate-tuberculate or smooth, regularly or irregularly pitted or without pits, yellow, red, brown, or black, provided with a shallow or papillae-form group of colorless cells (cucullus), which is conspicuous or reduced, deciduous or persistent. [Name Greek, meaning grove and to love.]

A genus of 11 species, chiefly of the western United States, extending to neighboring British Columbia and Lower California, and with 2 species in the southeastern states. Type species, *Nemophila phacelioides* Nutt.

Stems minutely recurved-prickly; leaves all alternate; corolla shorter than the calyx; seed globose, solitary; cucullus persistent. 1. *N. breviflora*.

Stems variously hispid or glabrate, never prickly; leaves all opposite or the upper alternate; corolla equaling or exceeding the calyx; seeds more or less ovoid, 2 to several; cucullus deciduous.

Capsule exceeded by the fruiting calyx; seeds pitted in rows; cucullus reduced.

2. *N. Kirtleyi*.

Capsule equaling or exceeding the fruiting calyx; seeds irregularly pitted or without pits; cucullus conspicuous.

Corolla 1 cm. or more broad; leaves all opposite.

Seeds corrugate-tuberculate; lower surfaces of leaves pale, bearing stomata; corolla white or blue and variously marked, but the lobes not purple-blotched.

4. *N. Menziesii*.

Seeds smooth or pitted; both surfaces of leaves alike, bearing stomata; corolla white and venose, but with a purple blotch at the tip of each lobe.

6. *N. maculata*.

Corolla less than 1 cm. broad.

Corolla pelviform or campanulate; filaments about equaling corolla-tube.

Auricles one-third as long as sepals at least in fruit; corolla pelviform, white and usually marked; plants of moist places or in light shade.

Leaves oblong or oval, deeply divided, truncate or weakly cuneate at base, paler and bearing stomata below. 3. *N. pedunculata*.

Leaves spatulate, shallowly lobed or toothed, strongly cuneate at base; surfaces alike, both bearing stomata. 5. *N. spatulata*.

Auricles less than one-third as long as sepals even in fruit; corolla pelviform or campanulate, white or bluish but unmarked; chiefly plants of shaded habitats.

Basal leaves divided into 5-7 similar, distinct, orbicular, petiolulate divisions, the sinuses broad; corolla pelviform; style usually 2-3 mm. long, conspicuously exerted from calyx. 8. *N. heterophylla*.

Basal leaves incised or shallowly lobed, some divisions dissimilar, confluent or not petiolulate; corolla campanulate; style 1.5 mm. or less long, not prominently exerted; seeds yellow or orange. 7. *N. parviflora*.

Corolla rotate or nearly so; filaments longer than corolla-tube.

Auricles conspicuous; seeds 4-10, corrugate-tuberculate; corolla-appendages conspicuous, free at tip. 4. *N. Menziesii*.

Auricles minute or obsolete; seeds 1-4, smooth or obscurely roughened; plants of central and northern California. 9. *N. pulchella*.

1. *Nemophila breviflora* A. Gray. Great Basin *Nemophila*. Fig. 4049.

Nemophila breviflora A. Gray, Proc. Amer. Acad. 10: 315. 1875.

Stems weak, 0.5-2 dm. tall, sharply angled and armed with minute, reflexed prickles, the stems otherwise glabrous. Leaves alternate, the lower ovate-deltoid, obtuse, subcordate, 0.7-3 cm. long, 1.5-4 cm. broad, pinnately divided into 3-6 oblong-lanceolate, falcate, remote, acute divisions, entire or with a single tooth, sparsely hispid, venose, glaucous beneath; flowers on very short pedicels; calyx-lobes linear-lanceolate, 3 mm. long, 1-2 mm. broad, the auricles reflexed, 1.5 mm. long; corolla narrowly campanulate, white or purplish, 1.5-3 mm. broad, the oval divisions shorter than the tube, the corolla shorter than the calyx; filaments shorter than the tube; appendages cuneate or linear, the free edge fimbriate, or reduced to hairy lines; style 0.5-1 mm. long; capsule 3-5 mm. in diameter, exceeded by the strongly accrescent calyx; seed usually 1, globose, 2-4 mm. in diameter, brick-red, smooth, but regularly and deeply pitted in rows; cucullus reduced, persistent.

Moist shade, usually of conifers, Transition and Boreal Zones; eastern Washington and Oregon to Modoc County, California; north to British Columbia, east to Montana, Idaho, Wyoming, Utah, and Nevada. Type locality: Parley's Park, Utah. May-July.

2. *Nemophila Kirtleyi* Henderson. Snake Canyon *Nemophila*. Fig. 4050.

Nemophila Kirtleyi Henderson, Bull. Torrey Club 27: 350. 1900.

Stems weak, 2-20 cm. long, sparsely hispid. Lower leaves opposite, the uppermost often alternate, oblong to ovate, 1.5-3.5 cm. long, 0.5-1.5 cm. broad, pinnately but usually shallowly lobed, the 3-7 lobes oblong to triangular-ovate, entire or 1-2-toothed, obtuse or acute, thinly hispid; calyx-lobes lanceolate-oblong, 4-6 mm. long, 2 mm. broad, the auricles 1-2 mm. long; corolla broadly campanulate or pelviform, white or bluish, 7-12 mm. broad, the obovate lobes about equaling the tube; filaments about equaling the tube; appendages broad, cuneate, the free edge fimbriate; style 2-5 mm. long; capsule globose or nearly so, 4-7 mm. in diameter, exceeded by the strongly accrescent calyx; seeds 2-4, cylindric-oblong or ovoid, 3-4 mm. long, yellowish brown, regularly pitted in rows; cucullus very small and flat, deciduous.

Moist shade, under rocks and bushes, Arid Transition and Upper Sonoran Zones; Snake River drainage system of Washington, Oregon, and Idaho. Type locality: Salmon River Hill, Florence, Idaho. May-July.

3. *Nemophila pedunculata* Dougl. Meadow *Nemophila*. Fig. 4051.

Nemophila pedunculata Dougl. ex Benth. Trans. Linn. Soc. 17: 275. 1835.

Nemophila sepulta Parish, Erythraea 7: 93. 1899.

Nemophila densa Howell, Fl. N.W. Amer. 1: 466. 1901.

Nemophila humifusa Kell. ex Eastw. Bull. Torrey Club 28: 141. 1901.

Nemophila nana Eastw. op. cit. 151.

Nemophila exigua Eastw. op. cit. 157.

Nemophila alata Eastw. op. cit. 158.

Nemophila minutiflora Suksd. Amer. Scientist 14: 32. 1903.

Nemophila reticulata Suksd. op. cit. 33.

Nemophila erosa Suksd. op. cit. 34.

Nemophila mucronata Eastw. ex Sheldon, Bull. Torrey Club 30: 300. 1903.

Nemophila eriocarpa Gandoger, Bull. Soc. Bot. Fr. 65: 64. 1918.

Nemophila insularis Eastw. ex J. T. Howell, Proc. Calif. Acad. IV. 21: 282. 1935.

Stems weak, succulent, angled or winged, 1-3 dm. tall, sparsely hispid or glabrate. Leaves all opposite, oblong to oval, 0.5-3.5 cm. long, 0.5-2 cm. broad, obtuse, slightly cuneate at base, pinnately and deeply divided into 5-9 short, oblong to obovate divisions, obtuse or acute, entire or 1-2-toothed, appressed-hispid; flowers in the axils, on short pedicels; calyx-lobes linear to ovate-lanceolate, 1-3 mm. long, 0.5-1.5 mm. broad, the auricles reflexed, 0.5-1.5 mm. long; corolla pelviform or campanulate, 3-6 mm. broad, white or pale blue, usually veined or spotted with black, blue, or purple, or each lobe with a terminal purple blotch, the lobes oblong to obovate, equaling or exceeding the tube; filaments about equaling the tube; appendages narrowly linear, the free edge hairy, or reduced to hairy lines; style a little less than 1 mm. long; capsule

3-6 mm. in diameter, exceeding the weakly accrescent calyx; seeds usually 2-8, ovoid, olive-green or brown, smooth or somewhat corrugated, 1-4 mm. long; cucullus usually papillaeform and often prolonged at one side, deciduous.

Wet open places or in light shade, Upper Sonoran, Transition, and Boreal Zones; throughout the Pacific Coast states, in suitable habitats, to British Columbia, Idaho, Nevada, and Lower California. Type locality: "on the Columbia." April-Aug.

4. *Nemophila Menziesii* Hook. & Arn. Baby Blue-eyes. Fig. 4025.

Nemophila Menziesii Hook. & Arn. Bot. Beechey 152. 1833.

Nemophila insignis Dougl. ex Benth. Trans. Linn. Soc. 17: 275. 1835.

Nemophila liniflora Fisch. & Mey. Sert. Petrop. pl. 8. 1846.

Nemophila modesta Kell. Proc. Calif. Acad. 7: 93. 1877.

Nemophila intermedia Bioletti, Erythraea 3: 141. 1895.

Nemophila Brandegei Eastw. Bull. Torrey Club 29: 471. 1902.

Nemophila macrocarpa Eastw. loc. cit.

Nemophila Evermannii Eastw. Proc. Calif. Acad. 20: 152. 1931.

Stems succulent, diffuse, obscurely winged or angled, 1-3 dm. long, pubescent. Leaves all opposite, linear-oblong to oval, 2-5 cm. long, 0.8-2.5 cm. broad, pinnately divided into usually 9-11 oblong to orbicular, obtuse divisions, entire or 1-3-toothed, appressed-hispid; flowers on slender pedicels which exceed the leaves; calyx-lobes lanceolate, 4-6 mm. long, 1-3 mm. broad, the auricles linear or lanceolate, 1.5-2.5 mm. long, reflexed; corolla pelviform to semi-rotate, 1.5-4 cm. broad, bright blue with a white center, or conspicuously blue-veined, or black-spotted in the center, the lobes obovate or oblong, exceeding the tube; filaments about equaling the tube; appendages broad or narrow, partly free or adherent or reduced to hairy lines; style 3-5 mm. long; capsule globose or ovoid, 0.5-1.5 cm. in diameter; seeds usually 10-20, ovoid to oblong, about 2 mm. long, dark brown or black, corrugate-tuberculate, the cucullus often papillaeform, deciduous.

Open, moist flats and slopes at low altitudes, Upper Sonoran and Transition Zones; cismontane California, from Mendocino and Shasta Counties to San Diego County. Type locality: California. Feb.-June.

Nemophila Menziesii var. *atomaria* (Fisch. & Mey.) Chandle. Bot. Gaz. 34: 204. 1902. (*Nemophila atomaria* Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 42. 1835; *N. Johnsonii* Eastw. Bull. Torrey Club 29: 472. 1902.) Herbage succulent and less hairy; corolla 1.5-3 cm. broad, white with black dots radiating from the center almost to the periphery, the lobes usually narrower; appendages usually reduced to hairy lines; seeds 8-12. Coast of central California to northwestern Oregon, in the Humid Transition Zone. Type locality: Fort Ross, Sonoma County, California.

Nemophila Menziesii var. *integrifolia* Parish, Erythraea 6: 92. 1898. (*Nemophila rotata* Eastw. Bull. Torrey Club 28: 159. 1901; *N. Menziesii* var. *annulata* Chandle. Bot. Gaz. 44: 381. 1907; *N. Menziesii* subsp. *australis* and vars. *incana* and *minima* Brand. Pflanzenreich 4²⁹³: 50. 1913.) Becoming very diffuse; lower leaves with only 5-7 entire or few-toothed lobes, the upper leaves entire or shallowly few-toothed, rhomboid, spatulate, or oblong, sessile or nearly so, greatly reduced upwards; corolla rotate or very shallow, pale or deep blue, punctate at the center with large black dots or blue-veined, or with a deep blue periphery, 0.6-1.5 cm. broad; corolla little longer than the calyx; appendages usually with a free, hairy edge or tip; filaments longer than the tube; capsule about equaling the moderately accrescent calyx; seeds 4-10. Mountains of southern California, southwest of the desert region, and adjacent Lower California. Type locality: San Bernardino County, California.

5. *Nemophila spatulata* Coville. Sierra Nemophila. Fig. 4053.

Nemophila spatulata Coville, Contr. U.S. Nat. Herb. 4: 156. 1893.

Nemophila humilis Eastw. Bull. Torrey Club 28: 150. 1901.

Nemophila Congdonii Eastw. op. cit. 151.

Nemophila pratensis Eastw. op. cit. 29: 474. 1902.

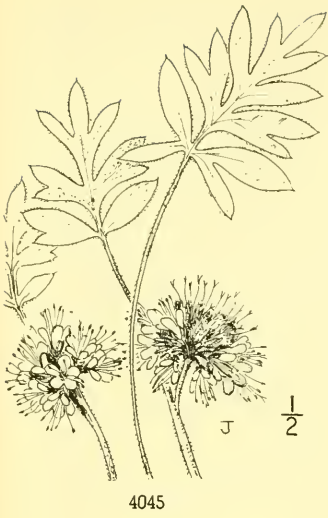
Stems weak, 1-3 dm. long, hispid or glabrate. Leaves all opposite, the lowest oval to orbicular, obtuse, cuneate at base, about 1 cm. long, 1 cm. broad, pinnately shallowly 3-5-lobed, the divisions oblong or ovate, entire, obtuse, the petioles winged, the upper leaves shallowly 3-5-toothed, with triangular-ovate teeth, appressed-hirsute or -hispid, with stomata on both surfaces; flowers on short pedicels; calyx-lobes 2.5-5 mm. long, 1-2 mm. broad, the auricles reflexed, 1-1.5 mm. long; corolla pelviform, 0.5-1 cm. broad, white or bluish and centrally punctate, venose, or with purple blotches on the ends of the oval lobes, the lobes exceeding the tube; filaments shorter than the tube; appendages broad, the free edge hairy, or narrower or reduced to hairy lines; capsule 4-7 mm. in diameter, exceeding the weakly accrescent calyx; seeds usually 5-6, ovoid, 3 mm. long, light brown, smooth but shallowly pitted, the cucullus usually papillaeform, deciduous.

Open meadows or in light shade, in the mountains, Transition and Boreal Zones; Sierra Nevada and mountains of southern California. Type locality: Whitney Meadows, Tulare County, California. May-July.

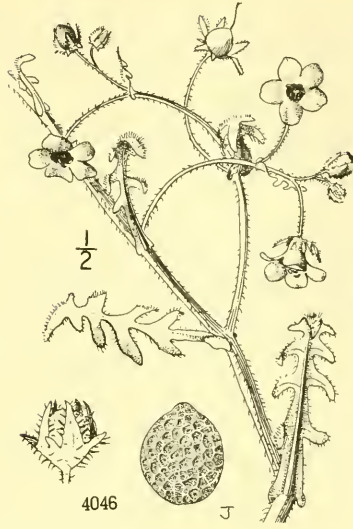
6. *Nemophila maculata* Benth. Fivespot. Fig. 4054.

Nemophila maculata Benth. ex Lindl. Journ. Hort. Soc. Lond. 3: 319. 1848.

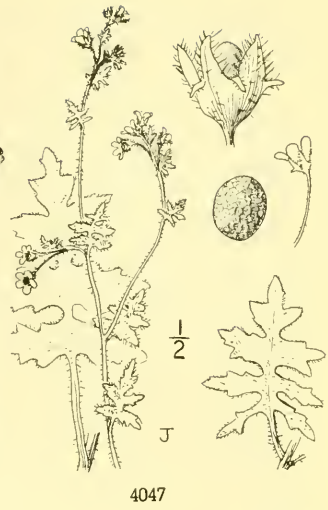
Stems succulent, loosely hispid or glabrate, 1-3 dm. long. Leaves all opposite, oval or oblong with a cuneate base, 0.8-2 cm. long, 0.3-0.8 cm. broad, pinnately and deeply 5-9-lobed, the lobes lanceolate to orbicular, the petioles equaling or exceeding the blade, the upper leaves nearly sessile, 3-toothed to entire, all hispid to hirsute, with stomata on both surfaces; flowers on long, stout pedicels; calyx-lobes lanceolate to triangular-ovate, 5-8 mm. long, 2-4 mm. broad, the auricles reflexed, 1-4 mm. long; corolla pelviform to nearly rotate, 1.5-4.5 cm. broad, white and veined or punctate, with a conspicuous purple blotch at the tip of each lobe, the lobes ob-lanceolate to obovate, exceeding the tube; filaments slightly exceeding the tube; appendages oblong or linear, pubescent on the free edge; style 3-6 mm. long; capsule 4-6 mm. in diameter,



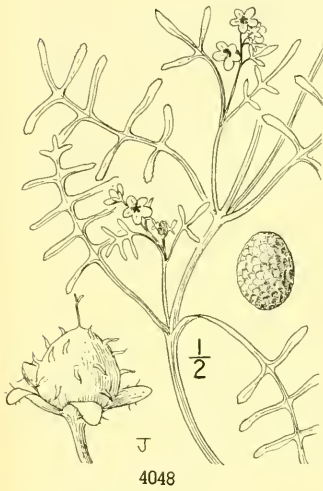
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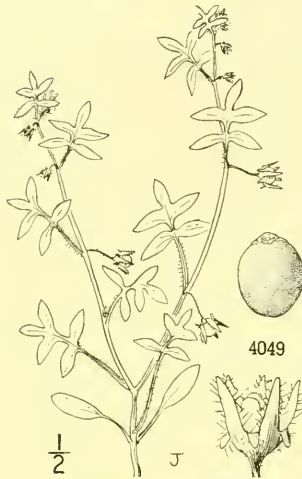
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4048



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4050



4051



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4053

4045. *Hydrophyllum capitatum*
 4046. *Pholistoma auritum*
 4047. *Pholistoma racemosum*

4048. *Pholistoma membranaceum*
 4049. *Nemophila breviflora*
 4050. *Nemophila Kirtleyi*

4051. *Nemophila pedunculata*
 4052. *Nemophila Menziesii*
 4053. *Nemophila spatulata*

slightly exceeding the calyx; seeds 5-12, ovoid, about 2 mm. long, smooth or shallowly pitted; cucullus usually papillaeform, deciduous.

Moist meadows, Transition and Upper Sonoran Zones; western foothills of the Sierra Nevada, from Plumas County to Kern County, California. Type locality: "in montibus Sacramento." April-June.

7. *Nemophila parviflora* Dougl. Small-flowered *Nemophila*. Fig. 4055.

Nemophila parviflora Dougl. ex Benth. Trans. Linn. Soc. 17: 275. 1835.

Nemophila macrophylla Eastw. Bull. Torrey Club 28: 144. 1901.

Nemophila micrantha Eastw. op. cit. 146.

Nemophila Kelloggii Eastw. op. cit. 147.

Nemophila Plaskettii Eastw. op. cit. 147.

Stems weak and brittle, densely hispid to glabrate, 0.5-6 dm. long. Lower leaves opposite, the upper alternate, the lower ovate to orbicular, 1-4 cm. long, 1-3 cm. broad, truncate or cordate at base, pinnately parted into usually 5 oblong or ovate, acute or obtuse lobes, these entire or again incisely toothed or lobed, the 2 lower often distinct, the 3 upper confluent, or all distinct but with narrow sinuses, petiolate, or the upper leaves nearly sessile and often asymmetrical at base, all appressed-hispid, thin in texture; flowers on short pedicels; calyx-lobes oblong- or ovate-lanceolate, 1-3 mm. long, 0.5-1.5 mm. broad, the auricles reflexed, 0.7-1 mm. long; corolla campanulate, white or bluish, 2-4 mm. broad, the lobes oval or obovate, about equaling the tube; filaments shorter than the tube; appendages linear, the free edge ciliate, or reduced to hairy lines or obsolete; capsule 3-5 mm. in diameter, exceeding the calyx; seeds usually 2-4, ovoid, 2-2.5 mm. long, yellow to brick-red, smooth but shallowly pitted; cucullus often papillaeform, deciduous.

Moist forest floors, Humid Transition Zone; western Washington and Oregon to Monterey County, California; north to Vancouver Island. Type locality: "from the Columbia." April-June.

Nemophila parviflora var. *Austiniae* (Eastw.) Brand, Pflanzenreich 4²⁵¹: 55. 1913. (*Nemophila inconspicua* Henderson, Bull. Torrey Club 27: 349. 1900; *N. Austiniae* Eastw. op. cit. 28: 143. 1901; *N. explicata* Nels. & Macbr. Bot. Gaz. 55: 377. 1913.) Leaves apparently all opposite, the lower orbicular, broadly cuneate at base, pinnately and shallowly lobed into 5-7 oblong or oval, entire divisions, with triangular-ovate teeth; auricles 0.2-0.4 mm. long; corolla 1.5-3 mm. long, barely exceeding the calyx; style 0.6-0.8 mm. long; appendages small and narrow, the apex free and fimbriate, or reduced to hairy lines or obsolete. Chiefly in coniferous woods, Great Basin, central Washington and Oregon to northern California, east to Idaho and Utah. Type locality: Davis Creek, Modoc County, California.

Nemophila parviflora var. *quercifolia* (Eastw.) Chndl. Bot. Gaz. 34: 210. 1902. (*Nemophila quercifolia* Eastw. Bull. Torrey Club 28: 142. 1901.) Densely villous or pilose; leaves all opposite, ovate or orbicular, cordate or truncate at base, crenately 5-7-lobed, the lobes orbicular to obovate, rounded, entire or few-toothed, densely villous; corolla 3-5 mm. broad, the lobes equaling or shorter than the tube; appendages usually narrow and glabrous; capsule 4-6 mm. in diameter. Dry coniferous forests of the Transition Zone; western slope of the southern Sierra Nevada. Type locality: Fresno County, California.

8. *Nemophila heterophylla* Fisch. & Mey. Variable-leaved *Nemophila*. Fig. 4056.

Nemophila heterophylla Fisch. & Mey. Sert. Petrop. pl. 8. 1846.

Nemophila exilis Eastw. Bull. Torrey Club 28: 148. 1901.

Nemophila flaccida Eastw. op. cit. 149.

Nemophila inaequalis Eastw. op. cit. 149.

Nemophila hispida Eastw. op. cit. 152.

Nemophila divaricata Eastw. op. cit. 153.

Nemophila tenera Eastw. op. cit. 153.

Nemophila nemorensis Eastw. op. cit. 155.

Nemophila fallax Eastw. op. cit. 156.

Nemophila glauca Eastw. op. cit. 156.

Nemophila decumbens Eastw. op. cit. 29: 473. 1902.

Nemophila diversifolia Eastw. loc. cit.

Stems delicate, hispid or glabrate, 1-3 dm. long. Lower leaves opposite, the upper alternate, the lower oblong to ovate, 1.5-2.5 cm. long, 0.5-1.8 cm. broad, pinnately divided into 5-7 usually orbicular, petiolulate, usually remote divisions, entire or 1-3-toothed, the uppermost leaves alternate, lanceolate to ovate, 3-5-lobed or entire, all hispid or glabrate; pedicels slender; calyx-lobes ovate-lanceolate, 2-3.5 mm. long, 0.5-1.5 mm. broad, the auricles spreading or reflexed, ovate, about 0.5 mm. long; corolla pelviform, white or bluish, 5-10 mm. broad, the lobes obovate; filaments about equaling the tube; appendages triangular, the free edge glabrous or ciliate, or reduced to hairy lines; style 2.5-3.5 mm. long, conspicuously exerted from the calyx; capsule 2-5 mm. in diameter, exceeding the calyx; seeds 2-4, yellowish brown, ovoid, 1-2 mm. long, smooth or minutely roughened; cucullus often papillaeform, deciduous.

Light shade of oaks or of brush, Upper Sonoran and Transition Zones; foothill region of the Coast Ranges and Sierra Nevada, from San Benito and Madera Counties, California, north to the Rogue River Valley, Oregon. Type locality: "in Nova-California ad sinum Bodega." April-July.

9. *Nemophila pulchella* Eastw. Eastwood's *Nemophila*. Fig. 4057.

Nemophila pulchella Eastw. Bull. Torrey Club 28: 157. 1901.

Stems loosely hispid to glabrate, 1-4 dm. long. Leaves all opposite or the uppermost occasionally alternate, the lower oblong to ovate, 2.5-4.5 cm. long, 1-2.5 cm. broad, pinnately divided into 5 usually remote, petiolulate, orbicular divisions, these usually toothed with broad sinuses, the uppermost leaves oblong or lanceolate, shallowly lobed or toothed, or entire, all loosely hispid or pilose; pedicels slender; calyx nearly rotate, the lobes oblong-lanceolate, 2-4 mm. long, 0.5-1.5 mm. broad, the auricles minute or entirely obsolete; corolla rotate, deep or pale blue with a white center, 5-12 mm. broad, the lobes oval or orbicular, exceeding the tube, the

corolla longer than the calyx; filaments exceeding the tube; appendages linear, the free edge hairy, or obsolete; style 2–3 mm. long, conspicuously exerted from the calyx; seeds 2–4, brown or greenish, about 1.8 mm. long, smooth or minutely roughened; cucullus usually shallow, deciduous.

Light shade under trees or brush, Transition and Upper Sonoran Zones; west slope of the southern Sierra Nevada, California. Type locality: Salt Creek, Kaweah, Tulare County. April–June.

Nemophila pulchella var. *gracilis* (Eastw.) Constance, Univ. Calif. Pub. Bot. 19: 394. 1941. (*Nemophila gracilis* Eastw. Bull. Torrey Club 28: 154. 1901.) Very diffuse; most of the leaves alternate, shallowly lobed or toothed; corolla white, rotate, smaller, scarcely exceeding the calyx; style 1–1.5 mm. long, barely exerted from the calyx; seed usually solitary. Mariposa County to Kern County, California, in the Upper Sonoran Zone. Type locality: "near Fresno," Fresno County, California.

Nemophila pulchella var. *fremontii* (Elmer) Constance, Univ. Calif. Pub. Bot. 19: 395. 1941. (*Nemophila fremontii* Elmer, Bot. Gaz. 41: 319. 1906.) Leaves all opposite, the lowest forming a conspicuous rosette; pedicels short; auricles 0.5 mm. long or represented by a few reflexed bristles or none; corolla semi-rotate, approximately equaling the calyx; corolla-scales reduced to hairy lines; style 0.5–1 mm. long, not exerted from the calyx; seeds usually 2–4. Light shade of the Upper Sonoran Zone; Tehachapi Mountains and Kern River Canyon, around the southeastern end of the San Joaquin Valley and north in the Inner Coast Ranges to Stanislaus and Monterey Counties, California. Type locality: Fremont's Peak, San Benito County, California.

4. *EUCRYPTA* Nutt. Journ. Acad. Phila. II. 1: 159. 1847.

Branched, viscid, scented, hispid, erect or diffuse annual herbs from slender taproots. Lowest leaves opposite, the others alternate, pinnately divided, petiolate, or the cauline sessile or clasping. Flowers several in open, terminal or axillary cymes, the pedicels filiform. Calyx divided one-half to two-thirds, the sinuses naked. Corolla white, yellowish, or blue, deciduous, campanulate, shallowly lobed, longer than the calyx. Stamens included, equal and equally inserted on the corolla; appendages minute or none and a V-shaped transverse fold between each pair of filaments near the throat. Style shortly bifid. Mature capsule unilocular (appearing falsely 5-locular), globose, or ovoid, exceeded by the enveloping or stellate-spreading, slightly accrescent calyx, loculicidally dehiscent. Ovules several on both surfaces of the two large parietal placentae, which are attached to the capsule wall by a dorsal ridge and their edges. Seeds usually 5–15, dimorphic (the internal, lenticular and smooth; the external, terete and corrugated) or homomorphic (all corrugated), brown or black. [Name Greek, meaning well and hidden, referring to the extra, concealed seeds.]

A genus of 2 species of the southwestern United States and adjacent Mexico. Type species, *Eucrypta paniculata* Nutt.

Mature calyx stellate-rotate beneath the capsule, the lobes spreading; seeds dimorphic. 1. *E. chrysanthemifolia*.
Mature calyx campanulate, its lobes erect and enclosing the capsule; seeds homomorphic, vermiform. 2. *E. micrantha*.

1. *Eucrypta chrysanthemifolia* (Benth.) Greene. Common *Eucrypta*. Fig. 4058.

Ellisia chrysanthemifolia Benth. Trans. Linn. Soc. 17: 247. 1834.

Eucrypta paniculata Nutt. Journ. Acad. Phila. II. 1: 159. 1847.

Eucrypta foliosa Nutt. loc. cit.

Eucrypta chrysanthemifolia Greene, Bull. Calif. Acad. 1: 200. 1885.

Ellisia Torreyi var. *Orcuttii* A. Gray, Syn. Fl. N. Amer. ed. 1. 2^a: 413. 1886.

Usually erect, stout, 1–4 dm. tall. Lower leaves oblong to broadly ovate, 5–10 cm. long, 2–5 cm. broad, pinnatifid, the 9–13 oblong-lanceolate lobes again 1–2-pinnatifid with mostly obtuse teeth, the upper leaves narrower and less divided, auriculate-clasping at base; flowers usually 8–15, the pedicels usually recurving in fruit; calyx-lobes obtuse, 1–2 mm. long, 1–1.5 mm. broad; corolla 5–8 mm. broad, yellowish white, the lobes orbicular, corolla-tube longer than the calyx; style 1–1.5 mm. long; capsule 2–4 mm. in diameter; each placenta with 2 ovules on each surface so that 8 are produced in each capsule; seeds dimorphic, the internal oval or orbicular and meniscoid, smooth, 1–1.5 mm. long, the external oblong-ovoid, terete, corrugated, 0.8–1 mm. long, both dark brown.

Under rocks or brush, Arid Transition and Sonoran Zones; central Coast Ranges of California to the San Bernardino Mountains, the Santa Barbara Islands, and Lower California. Type locality: California. March–June.

Eucrypta chrysanthemifolia var. *bipinnatifida* (Torr.) Constance, Lloydia 1: 147. 1938. (*Phacelia micrantha* var. ? *bipinnatifida* Torr. Ives Rep. 21. 1860; *Ellisia Torreyi* A. Gray, Proc. Amer. Acad. 20: 302. 1885.) Weak and diffuse; lowest leaves 2–4.5 cm. long, 1–2.5 cm. broad, pinnately divided into 7–9 oblong lobes, these shallowly pinnatifid, with rounded divisions; flowers usually 4–8; corolla 2–3 mm. broad, equaling to slightly longer than the calyx; capsule 2–3 mm. in diameter. Deserts of southeastern California to Nevada, Arizona, and Lower California. Type locality: Yampai Valley, Sitgreaves Pass, Black Mountains, Arizona.

2. *Eucrypta micrantha* (Torr.) Heller. Desert *Eucrypta*. Fig. 4059.

Phacelia micrantha Torr. Bot. Mex. Bound. 144. 1859.

Phacelia pinetorum M. E. Jones, Zoe 4: 279. 1893.

Ellisia micrantha Brand, Pflanzenreich 4²⁵¹: 42. 1913.

Eucrypta micrantha Heller, Muhlenbergia 2: 163. 1906.

Weak and diffuse, 0.5–2.5 dm. tall, the stems often stipitate-glandular. Lower leaves oblong or oval, 1–3 cm. long, 0.5–2 cm. broad, pinnatifid, the 7–9, oblong or spatulate, often falcate divisions entire or few-toothed, the upper leaves auriculate-clasping at base; flowers 4–12 on each branch of the inflorescence, the pedicels usually erect in fruit; calyx-lobes oblong to spatu-



4054. *Nemophila maculata*
4055. *Nemophila parviflora*

4056. *Nemophila heterophylla*
4057. *Nemophila pulchella*

4058. *Eucrypta chrysanthemifolia*
4059. *Eucrypta micrantha*

late, 1.5–2 mm. long, 1–1.5 mm. broad, often stipitate-glandular; corolla 2–4 mm. broad, purplish, blue, or white, with a yellow tube, the lobes oblanceolate, slightly longer than the calyx; style 1–1.5 mm. long; capsule 2–3 mm. in diameter, enveloped by the erect or slightly spreading calyx; seeds 7–15, homomorphic, but usually 1 or 2 in each capsule produced on the back of the placentae, dark brown or black, oblong and terete, but becoming incurved and vermiform, coarsely tuberculate or transversely corrugated at maturity, a little less than 1 mm. long.

Shaded places in the deserts, Sonoran Zones; desert areas of southeastern California to Nevada, western Texas, and Lower California. Type locality: stony hills near El Paso, Texas. Feb.–June.

5. PHACÈLIA Juss. Gen. 129. 1789.

Perennial, biennial, or annual herbs, variously pubescent and often glandular, from woody root crowns or taproots. Leaves prevailingly alternate or some of them opposite, the basal petiolate, entire or pinnately lobed, pinnatifid, or pinnately dissected. Flowers numerous to few in dense, simple or variously branched terminal scorpioid cymes, or the cymes lax and scarcely scorpioid, long-pedicellate to sessile. Calyx divided nearly to the base, the lobes equal to very unequal, often accrescent. Corolla violet to blue or white, deciduous, or tardily deciduous or marcescent in a few species, tubular to rotate, shorter to longer than the calyx, shallowly to more deeply lobed. Stamens exserted or included, subequal to unequal, equally inserted on the base of the corolla-tube; a pair of variably shaped scales attached to the corolla-tube at the base of each filament, wholly adnate or partially free from the tube, and often attached to the filament or to the free margin of the adjacent scale, or scales obsolete or completely absent. Style exserted or included, bifid

at the apex to divided nearly to the base. Mature capsule unilocular or nearly bilocular by the intrusion of the placentae, oblong to globose, loculicidally dehiscent. Ovules 2 to very numerous on the 2 prominent, linear placentae, laterally attached. Seeds oblong to orbicular, terete, angled, or flattened, foveolate or reticulate, or transversely corrugated, or excavated on each side of a salient ridge. [Name Greek, meaning cluster.]

A polymorphic American genus of perhaps 150–200 species, principally in the western United States and Mexico, but with a few species in the eastern United States and South America. Type species, *Hydrophyllum magellanicum* Lam.

Seeds not transversely corrugated, or if so the ventral surface of the seed excavated on each side of a salient ridge, and ovules only 2 to each placenta.

Corolla-scales a pair attached to the corolla-tube at the base of each filament, occasionally obsolete.

Seeds terete or angled and usually foveolate or reticulate, but not excavated.

Leaves pinnately toothed or lobed or pinnatifid, or pinnately decompound and often fernlike, their divisions variously toothed, lobed or pinnatifid. I.

Leaves entire to shallowly lobed, or pinnatifid or pinnate and the divisions or leaflets entire.

Corolla campanulate to rotate. III.

Corolla tubular or tubular-campanulate. IV.

Seeds excavated on the ventral surface on each side of a salient ridge; viscid and usually ill-scented desert plants. II.

Corolla-scales wanting, the base of the filaments sometimes with a dilation or wing. V.

Seeds transversely corrugated; ovules numerous. VI.

I

Perennial, or rarely biennials, often somewhat woody at base.

Corolla pelviform to subrotate; seeds 30–60, 1–1.5 mm. long.

4. *P. Bolanderi*.

Corolla campanulate to pelviform; seeds 2–18, 1.5–3 mm. long.

Inflorescence thyrsoid; corolla marcescent; seed-markings in vertical rows.

3. *P. sericea*.

Inflorescence globose or open; corolla deciduous; seed-markings not in vertical rows.

Calyx-lobes lanceolate to linear-oblong; corolla-lobes revolute; seeds 3–16.

Plants 5–15 dm. tall, usually erect, glandular in the inflorescence; corolla greenish white.

2. *P. procera*.

Plants 1–3 dm. tall, usually decumbent or ascending, appressed-hirsute throughout; corolla purplish blue to white.

1. *P. hydrophyloides*.

Calyx-lobes oblanceolate to spatulate; corolla-lobes plane; seeds 2–4.

Calyx-lobes spatulate, 5–6 mm. long; corolla 5–8 mm. long; branches usually decumbent or prostrate.

5. *P. ramosissima*.

Calyx-lobes oblanceolate, 2–3 mm. long; corolla 3–5 mm. long; branches erect or ascending.

6. *P. cinerea*.

Annuals.

Seeds 10–40, 0.5–0.75 mm. long.

Basal leaves ovate, scattered; flowers sessile; corolla 5–8 mm. long and broad. 7. *P. Lyonii*.

Basal leaves oblong, rosulate; flowers long-pedicellate, the pedicels elongate and recurved; corolla 6–15 mm. long, 8–20 mm. broad. 48. *P. Douglasii*.

Seeds 1–8, 1.5–3.5 mm. long.

Calyx-lobes pinnatifid, with 3–5 oblong or oblanceolate, divergent divisions. 8. *P. floribunda*.

Calyx-lobes entire, or one or two of them crenate and the others entire.

Leaves simple, shallowly lobed, broad and flaccid; plants prickly-hispid throughout.

Stamens exserted, 5–10 mm. long; style exserted, 8–12 mm. long; corolla broadly campanulate, 5–7 mm. long and broad; coastal. 15. *P. malvaefolia*.

Stamens included, 2–3 mm. long; style included, 2–3 mm. long; corolla narrowly campanulate, 4–5 mm. long and broad; inland. 16. *P. Rattanii*.

Leaves pinnate or pinnatifid, often deeply dissected and fernlike, in some shade forms broad, flaccid, and merely lobed.

Calyx-lobes markedly enlarged in fruit, oblong-lanceolate to ovate, subcoriaceous and strongly venose.

Stamens about as long as the pelviform corolla; corolla 8–12 mm. long and broad, blue with a lighter center. 17. *P. ciliata*.

Stamens much shorter than the campanulate-funnelform corolla; corolla 3–4 mm. long, 2–3 mm. broad, white or pale blue. 18. *P. thermalis*.

Calyx-lobes neither subcoriaceous nor venose, if conspicuously enlarged, either linear or spatulate.

Calyx-lobes dimorphic: 2 ovate and crenate or entire, 3 lanceolate to narrowly spatulate. 10. *P. platyloba*.

Calyx-lobes equal or unequal, but not dimorphic and always entire.

Corolla lavender or white; calyx-lobes linear or linear-oblanceolate, up to 1 cm. long in fruit, often conspicuously clawed and loosely enveloping the capsule.

Corolla broadly campanulate, 8–12 mm. long and broad, much longer than the calyx.

Flowers numerous, crowded; fruiting pedicels very fragile; capsules with pustulate bristles; mostly cismontane. 12. *P. cicutaria*.

Flowers few, remote; fruiting pedicels relatively persistent; capsule hirsutulous, scarcely bristly; deserts. 14. *P. vallis-mortae*.

Corolla campanulate-funnelform, 4–7 mm. long, 3–4 mm. broad, about as long as the calyx. 13. *P. cryptantha*.

Corolla bluish purple to white; calyx-lobes linear to obovate, little or not at all enlarged in fruit and considerably less than 1 cm. long, closely investing the capsule.

Cymes scattered, subsessile; calyx-lobes lanceolate to oblanceolate or obovate; corolla promptly deciduous; capsule globose, 2–3 mm. long, hairy to below the middle. 9. *P. distans*.

Cymes approximate in pedunculate clusters; calyx-lobes linear to linear-lanceolate; corolla tardily deciduous; capsule broadly ovoid, 3–4 mm. long, hairy only at apex. 11. *P. tanacetifolia*.

II

Stamens and style prominently exerted.

Flowers on slender, filiform pedicels; calyx-lobes scarious in fruit.

21. *P. pedicellata*.

Flowers short-pedicellate or subsessile; calyx-lobes not scarious.

Seeds thick, transversely corrugated; calyx-lobes oblanceolate to oval.

19. *P. crenulata*.

Seeds thin, not corrugated; calyx-lobes lanceolate.

20. *P. amabilis*.

Stamens and style included.

Inflorescence corymbose; corolla 3-4 mm. long and broad; seeds thick, transversely corrugated.

23. *P. coerulea*.

Inflorescence thyrsoid; corolla about 6 mm. long and broad; seeds thin.

22. *P. Anelsonii*.

III

Perennials or biennials.

Leaves with conspicuous parallel lateral veins; inflorescence usually densely congested and conspicuously scorpioid.

Foliage conspicuously silvery or white-hispid, the leaves predominantly entire. (See also varieties of *P. californica*, no. 25.)

Leaves oval to suborbicular, the veins deeply impressed; coastal sand dunes.

26. *P. argentea*.

Leaves linear-lanceolate to oval, the veins prominent but not deeply impressed; montane or Great Basin.

Cespitose montane plants, 1-2 dm. tall; foliage and calyx hispid.

31. *P. frigida*.

Slender plants of the Great Basin, 2-5 dm. tall; foliage and calyx softly hairy.

28. *P. leucophylla*.

Foliage green or gray, but scarcely silvery, usually some or all the leaves lobed to pinnatifid.

Plants slender or stout, not cespitose; stems and inflorescence variously pubescent but nonglandular.

Calyx-lobes broad, overlapping in fruit; corolla-lobes conspicuously incurved and embracing the filaments and style after anthesis.

24. *P. imbricata*.

Calyx-lobes narrower, not overlapping; corolla-lobes not conspicuously incurved.

Foliage gray or hoary, the cauline leaves usually pinnatifid; pubescence hirsutulous or pilose as well as bristly; calyx accrescent in fruit.

Stems usually solitary; inflorescence virgate; corolla greenish white.

27. *P. heterophylla*.

Stems usually several, often decumbent; inflorescence of racemose or subcapitate cymes; corolla lavender or white.

25. *P. californica*.

Foliage green, at least the upper cauline leaves usually entire; inflorescence often purplish; pubescence bristly; calyx little accrescent, glistening.

Stems usually solitary, stout, 5-15 dm. tall.

29. *P. nemoralis*.

Stems several, slender, 1-4.5 dm. tall.

30. *P. mutabilis*.

Plants cespitose; stems and inflorescence glandular-puberulent.

32. *P. corymbosa*.

Leaves without conspicuous parallel lateral veins; inflorescence lax and scarcely scorpioid.

33. *P. Dalesiana*.

Annuals.

Inflorescence lax, scarcely scorpioid; style parted nearly to the base.

Leaves succulent, glabrous and glaucous, all but the uppermost opposite.

35. *P. racemosa*.

Leaves herbaceous, pubescent, the upper alternate.

Plants glandular-puberulent throughout; pedicels short; corolla pelviform to subrotate.

34. *P. Pringlei*.

Plants softly hirsute and little glandular; pedicels slender; corolla broadly campanulate.

Basal leaves linear-oblong to oval; corolla 2-4 mm. long; stamens usually included.

36. *P. Eisenii*.

Basal leaves linear-lanceolate; corolla 4-6 mm. long; stamens usually exerted.

37. *P. orogenes*.

Inflorescence rather dense, or if lax, distinctly scorpioid.

Corolla marcescent or tardily deciduous; style glandular-hirsute.

40. *P. marcescens*.

Corolla rather promptly deciduous; style pubescent or glabrous, nonglandular.

Plants glandular.

Corolla pelviform; style parted about to the middle.

Leaves oblong to ovate; calyx-lobes narrowly spatulate to obovate.

Plants hirsute; corolla nearly white, 5-6 mm. long; coastal.

51. *P. grisea*.

Plants puberulent and hirsutulous; corolla lavender, 6-8 mm. long; Sierran.

52. *P. Purpusii*.

Leaves linear to oblanceolate; calyx-lobes linear to narrowly oblanceolate.

41. *P. mohavensis*.

Corolla campanulate; style parted nearly to the base.

45. *P. verna*.

Plants variously pubescent, glandular if at all only in the inflorescence.

Fruiting pedicels elongate and spreading or recurved in fruit; seeds 1 mm. or less long.

Leaves usually once or twice pinnatifid; seeds 10-20, 0.5-1 mm.

48. *P. Douglasii*.

Leaves usually entire, or incisely lobed; seeds 6-16, about 1 mm.

47. *P. curvipes*.

Fruiting pedicels erect or ascending, not elongating appreciably in fruit.

Seeds 1-4, 2-2.5 mm. long.

Leaves entire; corolla violet; stamens exerted, the filaments pubescent.

39. *P. humilis*.

Leaves usually pinnately lobed or pinnatifid; corolla pale blue or lavender to white; stamens included, the filaments glabrous.

38. *P. Breweri*.

Seeds 6-15, 1-2 mm. long.

Cymes thyrsoid-paniculate; capsule terete, acuminate.

43. *P. linearis*.

Cymes simple or few-branched; capsule flattened.

Corolla 10-18 mm. long, 15-24 mm. broad; stamens 8-10 mm. long, the filaments usually hairy; coastal.

49. *P. divaricata*.

Corolla 6-9 mm. long, 7-9 mm. broad; stamens 3-5 mm. long, the filaments papillate or glabrous; Sierra Nevada and Tehachapi ranges.

50. *P. Congdonii*.

IV

Style parted to the middle or below.

Plants glabrous or glabrate and glaucous below the inflorescence; all but the uppermost cauline leaves opposite. 35. *P. racemosa*.

Plants variously pubescent throughout, not glaucous; cauline leaves, or most of them, alternate.

Plants prickly-hispid; leaves flaccid, shallowly lobed all around, the lobes crenate or dentate.

16. *P. Rattanii*.

Plants hirsute or hirsutulous and usually glandular; leaves firm, entire or with a few entire lobes at the base.

Capsule terete; filaments papillate or glabrous.

Leaves narrowly oblanceolate to ovate-lanceolate, 3–5 mm. broad; corolla 3–4 mm. long, usually shorter than the calyx. 42. *P. minutissima*.

Leaves ovate-lanceolate to ovate, 5–10 mm. broad; corolla 4–6 mm. long, longer than the calyx.

44. *P. vallicola*.

Capsule flattened; filaments hairy.

46. *P. phacelioides*.

Style merely bifid at the apex, or cleft at most one-third.

Perennial from a suffrutescent caudex, the older stems white-tomentose; capsules often persistent and becoming hardened. 53. *P. perityloides*.

Annual from a slender taproot, the stems without tomentum; capsules permanently membranaceous.

Corolla deciduous; seeds oblong to ovoid, terete or angled.

Leaves prominently venose; ovules few (4–8) to each placenta.

54. *P. suaveolens*.

Leaves without prominent lateral veins; ovules numerous (10–100) to each placenta.

Petioles slender, equaling or exceeding the leaf-blades; flowers slender-pedicellate in lax cymes.

Corolla purple or violet, campanulate-funnelform, 7–14 mm. long, 4–8 mm. broad; style 3.5–5 mm. long. 55. *P. pulchella*.

Corolla pale violet to white, about 5 mm. long, 2.5–3 mm. broad; style 1.5–2 mm. long.

56. *P. rotundifolia*.

Petioles shorter than the leaf-blades; flowers short-pedicellate or subsessile in compact cymes.

Cymes pedunculate; seeds about 25, 1–1.5 mm. long.

58. *P. Parishii*.

Cymes subsessile; seeds 50–100, 0.5 mm. long.

57. *P. Lemmonii*.

Corolla marcescent; seeds orbicular, flattened.

59. *P. saxicola*.

V

Filaments with a dilation or wing at base; style parted above the middle.

Corolla subrotate or pelviform, the tube about equaling the limb.

Leaves coarsely dentate, serrate, or lobed; corolla violet with white or yellow markings at the center; filament-dilations pubescent. 60. *P. Parryi*.

Leaves crenate or crenate-dentate; corolla white (rarely blue); filament-dilations glabrous.

61. *P. longipes*.

Corolla tubular-campanulate or campanulate-funnelform, the tube about twice as long as the limb.

Corolla tubular-campanulate, constricted at the throat; chiefly coastal.

62. *P. minor*.

Corolla campanulate-funnelform, not constricted; deserts.

63. *P. campanularia*.

Filaments without a basal dilation or wing; style parted to below the middle.

Inflorescence rather lax, at least some pedicels slender; corolla 8–18 mm. broad, the center darker-colored than the periphery, or the whole corolla white; filaments pubescent. 64. *P. viscida*.

Inflorescence dense, the pedicels all short; corolla 30–50 mm. broad, the center colored like the periphery; filaments glabrous. 65. *P. grandiflora*.

VI

Leaves broadly oval to orbicular, cordate, entire to crenulate-dentate; styles divided about to the middle; calyx-lobes shorter than the capsule; seeds about 50 to more than 100.

Corolla 10–15 mm. long; calyx-lobes 3–4 mm. long; seeds about 50.

66. *P. calthifolia*.

Corolla 5–7 mm. long; calyx-lobes 2–3 mm. long; seeds more than 100.

67. *P. pachyphylla*.

Leaves linear-oblong to oval, cuneate or truncate, pinnately lobed to bipinnatifid; styles divided one-fourth or less; calyx-lobes longer than the capsule; seeds 5 to about 20.

Corolla 2–4.5 mm. long, shorter than to about equaling the calyx.

Calyx-lobes linear to linear-ob lanceolate.

68. *P. Ivesiana*.

Calyx-lobes spatulate.

69. *P. affinis*.

Corolla 6–15 mm. long, at least twice the length of the calyx.

Leaves deeply pinnately lobed to bipinnatifid; seeds about 12–20.

Leaves bipinnatifid; calyx-lobes linear to linear-ob lanceolate.

70. *P. bicolor*.

Leaves pinnately lobed or pinnatifid; calyx-lobes spatulate.

Corolla-limb white; seeds about 20, about 0.5 mm. long.

71. *P. brachyloba*.

Corolla-limb blue; seeds about 12, 1–1.25 mm. long.

72. *P. Fremontii*.

Leaves shallowly pinnately lobed; seeds 5–8.

73. *P. gymnoclada*.

1. *Phacelia hydrophylloides* Torr. Waterleaf *Phacelia*. Fig. 4060.

Phacelia hydrophylloides Torr. ex A. Gray, Proc. Amer. Acad. 7: 400. 1868.

Perennial from a woody base, 1–3 dm. tall, softly appressed-hirsute throughout; stems simple or branched, decumbent or ascending from the base. Basal leaves alternate, oblong-oval, 3–5 cm. long, 1.5–3 cm. broad, tapering into a petiole of about equal length, coarsely toothed or lobed, or pinnatifid at base with a pair of oblong lobes; cauline leaves alternate, numerous, like the basal; flowers rather numerous, short-pedicellate in small globose cymes, 1–3 cm. long, the cymes spreading in fruit; calyx-lobes linear-oblong, 3–4 mm. long, about 0.5 mm. broad, densely hirsute on the margins, nonaccrescent; corolla purplish blue to white, broadly campanulate, deciduous, 5–6 mm. long, 6–8 mm. broad, the lobes ovate, acute because of their laterally recurved margins, 2–2.5 mm. long, the whole slightly longer than the calyx; stamens long-exserted, about 8 mm. long, the anthers oblong-oval, 1–1.5 mm. long; scales oblong to oval, adnate, united over the base of the filament; style long-exserted, 8–10 mm. long, cleft to the middle or below; capsule

ovoid, 5–6 mm. long, acute, finely strigulose; seeds 3–8, oblong-angled, about 2 mm. long, dark brown, irregularly reticulate without long ridges.

Open woods, often in granite soil, Boreal Zones; Gearhart Mountain, south central Oregon, through the Sierra Nevada to Tulare County, California; also in adjacent Nevada. Type locality: Ebbetts Pass and near Lake Tenaya, California. June–Aug.

2. *Phacelia procera* A. Gray. Tall *Phacelia*. Fig. 4061.

Phacelia procera A. Gray, Proc. Amer. Acad. 10: 323. 1875.

Perennial, 5–15 dm. tall, sparsely appressed-hirsutulous and glandular in the inflorescence; stems simple, erect. Basal leaves ovate to lanceolate, 7–12 cm. long, 3–5 cm. broad, tapering into a petiole of about equal length, toothed to pinnately incised or pinnatifid, the teeth or lobes lanceolate, entire or incisely toothed; cauline leaves alternate, numerous, like the basal but short-petiolate; flowers numerous, subsessile in a rather dense, broad panicle of frequently geminate cymes, 3–15 cm. long, the cymes ascending in fruit; calyx-lobes narrowly lanceolate, 3–5 mm. long, 1–1.5 mm. broad, appressed-hirsute and glandular, scarcely accrescent; corolla greenish white, deciduous, pelviform, 5–6 mm. long, 7–9 mm. broad, hairy within, the lobes ovate, 2–3 mm. long, revolute, the whole slightly longer than the calyx; stamens long-exserted, 8–10 mm. long, the anthers oval, about 1 mm. long; scales oblong, adnate, united over the base of the filaments; style about 10 mm. long, cleft about one-half; capsule ovoid, 6–8 mm. long, acute, glandular-hirsutulous; seeds 12–16, about 2 mm. long, ovoid-angled, black, irregularly reticulate.

Wet places in thickets and meadows, Boreal Zones; Cascade Mountains of Washington to the northern Coast Ranges and Sierra Nevada of California, east to Idaho. Type locality: Sierra Nevada, Nevada and Sierra Counties, California. June–July.

3. *Phacelia sericea* (Graham) A. Gray. Silky *Phacelia*. Fig. 4062.

Eutoca sericea Graham, Bot. Mag. 56: pl. 3003. 1829.

Phacelia sericea A. Gray, Amer. Journ. Sci. II. 34: 254. 1862.

Phacelia lenta Piper, Bull. Torrey Club 28: 44. 1901.

Phacelia sericea var. *caespitosa* Brand, Pflanzenreich 4261: 107. 1913.

Perennial from a woody root crown, or sometimes biennial, 1–4 dm. tall, densely silvery and appressed-silky throughout, or the foliage greenish and subglabrate; stems simple, erect or ascending from the base. Basal leaves alternate, oblong to oblong-oval, 2–6.5 cm. long, 1–3 cm. broad, tapering into a petiole of about equal length, pinnately lobed or pinnatifid, the lobes oblong, entire or toothed; cauline leaves alternate, numerous, like the basal but short-petiolate to sessile; flowers short-pedicellate, numerous, in a narrow, thyrsoid panicle of very short cymes, 2–15 cm. long, the cymes ascending in fruit; calyx-lobes linear-lanceolate to linear-oblong, 3–4 mm. long, 0.5 mm. or less broad, hirsute at least marginally, nonaccrescent; corolla bluish purple to white, pelviform, marcescent, 5–6 mm. long, 6–8 mm. broad, hairy within, the lobes ovate, 2–3 mm. long, the whole longer than the calyx; stamens long-exserted, 10–15 mm. long, hairy at base, the anthers oblong-oval, less than 1 mm. long; scales lanceolate to oblong, membranaceous, free from the stamens; style long-exserted, 6–8 mm. long, cleft one-third to one-half; capsule ovoid, 4–6 mm. long, acute, hirsute; seeds 8–18, oblong-ovoid, 1.5–2 mm. long, dark brown to black, regularly reticulate, with longitudinal ridges.

Talus slopes, Boreal Zones; Olympic and Cascade Mountains of Washington to the Blue, Steen, and Warner Mountains of southern Oregon and northeastern California; also north and east from British Columbia and Alberta to the Great Basin and the Rocky Mountains. Type locality: Rocky Mountains. June–Aug.

4. *Phacelia Bolánderi* A. Gray. Bolander's *Phacelia*. Fig. 4063.

Phacelia Bolanderi A. Gray, Proc. Amer. Acad. 10: 322. 1875.

Perennial, 3–12 dm. tall, appressed-hirsute to subglabrate and glandular throughout; stems usually branched, decumbent or ascending from the base. Basal leaves alternate, oval, 6–10 cm. long, 3–6 cm. broad, tapering or truncate, with a slender petiole of greater or equal length, coarsely toothed or lobed, or pinnatifid at base with a pair of oblong lobes; cauline leaves alternate, numerous, like the basal but often short-petiolate; flowers rather numerous, short-pedicellate in broad cymes, 3–8 cm. long, the cymes spreading widely in fruit; calyx-lobes oblong-lanceolate, 6–7 mm. long, 1.5–2 mm. broad, glandular-hispid on the margins, often slightly accrescent; corolla lavender, pelviform to subrotate, deciduous, about 10 mm. long, 10–20 mm. broad, the lobes obovate, about 5 mm. long, the whole much longer than the calyx; stamens slightly exserted, about 10 mm. long, sparsely hirsute, the anthers oval, about 1 mm. long; scales narrow, adnate; style slightly exserted, about 10 mm. long, cleft about two-thirds; capsule ovoid, 6–8 mm. long, acute, hirsute; seeds 30–60, irregularly cylindrical, 1–1.5 mm. long, light brown, foveolate.

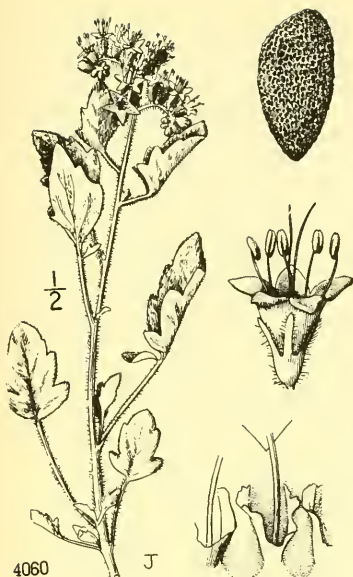
Moist banks, chiefly in the Redwood belt, Humid Transition Zone; coastal, from Coos Bay, Oregon, to Sonoma County, California. Type locality: Cottonaby Creek, Mendocino County, California. May–June.

5. *Phacelia ramosissima* Dougl. Branching *Phacelia*. Fig. 4064.

Phacelia ramosissima Dougl. ex Lehm. Stirp. Pug. 2: 21. 1830.

Phacelia decumbens Greene, Pittonia 5: 17. 1902.

Perennial, 5–12 dm. tall, hispid, finely cinereous-pubescent and hirsute or hispid throughout and glandular-viscid at least in the inflorescence; stems several from the woody root crown, usually diffuse, simple or widely branched. Basal leaves oblong to broadly ovate, 5–10 cm. long, 2–6 cm. broad, pinnate, the oblong or oval lobes toothed, incised, or once or twice pinnatifid, the petiole usually much shorter than the blades; cauline leaves like the basal but short-petiolate or



4060



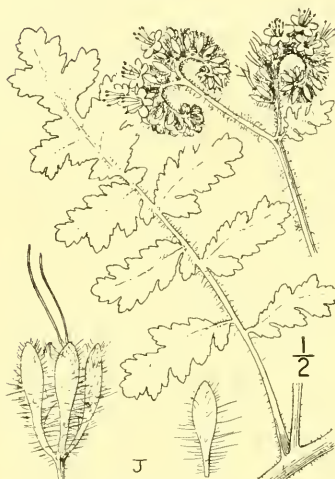
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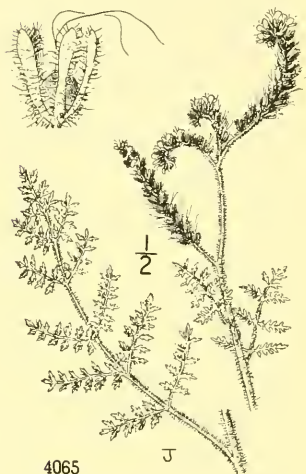
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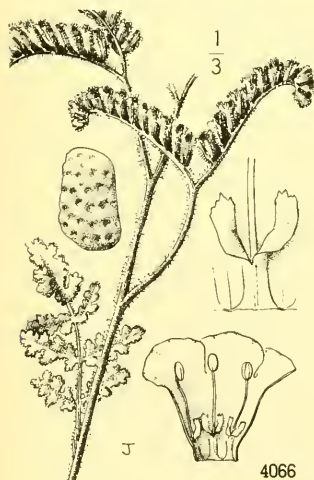
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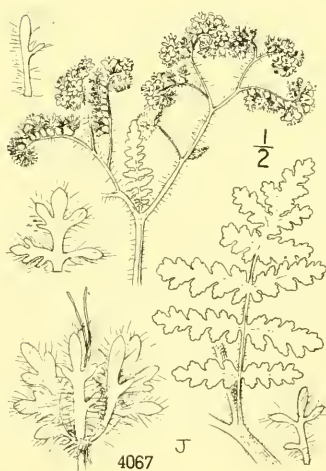
4064



4065



4066



4067



4068

4060. *Phacelia hydrophylloides*
 4061. *Phacelia procera*
 4062. *Phacelia sericea*

4063. *Phacelia Bolanderi*
 4064. *Phacelia ramosissima*
 4065. *Phacelia cinerea*

4066. *Phacelia Lyonii*
 4067. *Phacelia floribunda*
 4068. *Phacelia distans*

sessile; flowers rather numerous, subsessile in short, dense, scattered cymes, the cymes 2–8 cm. long, erect in fruit; calyx-lobes spatulate, tapering gradually at base, 5–6 mm. long, 1–2.5 mm. broad, densely glandular-hispid, little enlarged in fruit; corolla dirty white or bluish, campanulate, deciduous, 5–8 mm. long, 6–10 mm. broad, the lobes oval, 2–3 mm. long, spreading, the whole a little longer than the calyx; stamens exserted, 7–10 mm. long, the filaments glabrous, the anthers oval, about 0.5 mm. long; scales ovate, attenuate upward, adnate only at the base of the filament; style exserted, 7–10 mm. long, glabrous, cleft two-thirds; capsule ovoid, 3–4 mm. long, hispid and pubescent; seeds usually 2 or 4, oblong-ovoid, 2.5–3 mm. long, dark brown, finely foveolate.

Rocky slopes and bluffs, Transition and Sonoran Zones; central Washington to central California. Type locality: "Dry rocky plains of the Columbia, near Priest's Rapid, 'and at the Stony Islands'." June–July.

Phacelia eremophila Greene, *Pittonia* 5: 20. 1902. (*Phacelia fastigiata* Greene, *Pittonia* 5: 18. 1902; *P. ramosissima* var. *valida* M. E. Peck, *Torreya* 28: 56. 1928; *P. ramosissima* var. *subglabra* M. E. Peck, op. cit. 55; *P. alvordensis* M. E. Jones, *Contr. West. Bot.* No. 17: 30. 1930.) Stems nonglandular and sparsely if at all hispid; calyx-lobes usually linear-oblancoolate, tapering gradually, distant. South central Oregon to Kern County, California, in the Sierra Nevada, and western Nevada. Type locality: "West Humboldt Mountains," Nevada.

Phacelia suffrutescens Parry, *Proc. Davenp. Acad.* 4: 38. 1884. (*Phacelia bifurca* Greene, *Pittonia* 5: 18. 1902; *P. subsinuata* Greene, op. cit. 19; *P. polystacha* Greene, op. cit. 19.) Stems glandular or only hispid; calyx-lobes obovate or ovate-lanceolate, narrowed abruptly into a basal claw, approximate. Central California coast and southern Sierra Nevada (Kern Canyon) to southern California, Utah, northern Arizona and Lower California. Type locality: southern California.

6. *Phacelia cinerea* Eastw. San Nicolas *Phacelia*. Fig. 4065.

Phacelia cinerea Eastw. ex J. F. Macbride, *Contr. Gray Herb.* No. 49:26. 1917.

Perennial, perhaps 5 dm. tall from a fascicle of fibrous roots, densely hirsutulous and glandular throughout. Leaves broadly ovate, 5–8 cm. long, 3–4 cm. broad, 2–3-pinnate, the ultimate divisions very fine, the petiole shorter than the blade; cauline leaves like the basal, the uppermost sessile; flowers numerous, subsessile in short, dense, branched cymes, the cymes 2–4 cm. long, erect in fruit; calyx-lobes oblanceolate, 2–3 mm. long, 0.5 mm. broad, densely glandular-hirsutulous, little enlarged in fruit; corolla blue, broadly campanulate, deciduous, 3–5 mm. long and broad, the lobes oval, 1.5–2 mm. long, the whole a little longer than the calyx; stamens exserted, 5–6 mm. long, the anthers oval, 0.5 mm. long; style 3–5 mm. long, cleft below the middle; capsule oblong-ovoid, 1.5–2 mm. long, hirsutulous; seeds 3–4, oblong-ovoid, 1.5 mm. long, dark brown, foveolate.

Known only from moist flats near the sea, San Nicolas Island, Ventura County, California (the type locality). March–April.

7. *Phacelia Lyonii* A. Gray. Lyon's *Phacelia*. Fig. 4066.

Phacelia Lyonii A. Gray, *Proc. Amer. Acad.* 20: 303. 1885.

Annual, 3–12 dm. tall from a slender taproot, densely glandular and somewhat hispid throughout; stems erect or ascending, branched. Basal leaves alternate, ovate, 5–10 cm. long, 3–8 cm. broad, pinnate and then pinnatifid, the divisions crenate-dentate, the petiole much shorter than the blade; cauline leaves alternate, rather few, like the basal; flowers numerous, sessile in a short, dense panicle of cymes, the cymes 4–8 cm. long, ascending in fruit; calyx-lobes spatulate, 4–5 mm. long, 1 mm. broad, densely glandular-hispid, 7–8 mm. long, 1.5–2 mm. broad in fruit; corolla bluish white, broadly campanulate, deciduous, 5–8 mm. long and broad, the lobes obovate, about 2 mm. long, the whole longer than the calyx; stamens included, 4–5 mm. long, the anthers oblong, 0.75 mm. long; scales broadly ovate, attached to the filament at base; style included, about 3 mm. long, cleft to the middle; capsule oblong-ovoid, 5–7 mm. long, acute, sparsely pubescent; seeds 20–40, oval, flattened, 0.5–0.75 mm. long, black, foveolate.

Rocky banks and cliffs, Sonoran Zones; endemic to Santa Catalina Island, the type locality, and San Clemente Island, California. May–June.

8. *Phacelia floribunda* Greene. Island *Phacelia*. Fig. 4067.

Phacelia phyllomanica var. *interrupta* A. Gray, *Proc. Amer. Acad.* 11: 87. 1876.

Phacelia floribunda Greene, *Bull. Calif. Acad.* 1: 200. 1885.

Annual, 3–6 dm. tall from a taproot, hirsute and glandular-puberulent throughout; stems stout, erect, branching. Basal leaves ovate, 5–15 cm. long, 2–9 cm. broad, pinnate, the oblong or oval divisions pinnatifid, then crenate-dentate, the petiole usually much shorter than the blade; cauline leaves like the basal; flowers numerous, subsessile, in a panicle of dense, crowded cymes, the cymes 2–6 cm. long, erect in fruit; calyx-lobes orbicular, 3–5 mm. long, 2–3 mm. broad, pinnatifid with 3–5 oblong or oblanceolate, divergent lobes, densely short-hirsute, or 1 or 2 linear-spatulate and entire, scarcely enlarged in fruit; corolla pale blue, broadly campanulate, deciduous, 4–6 mm. long and broad, the divisions oval, 1–1.5 mm. long, the whole longer than the calyx; stamens slightly exserted, 5–6 mm. long, the filaments glabrous, the anthers oval, 1.5 mm. long; scales oblanceolate, adnate; style included, 2–3 mm. long, glabrous, cleft two-thirds; capsule ovoid, 2–3 mm. long, hirsute; seeds 1–4, oblong-ovoid, 1.5–2 mm. long, dark brown, coarsely foveolate.

Sheltered slopes or flats, Sonoran Zones; San Clemente Island, California, and Guadalupe Island, Lower California. Type locality: Guadalupe Island. March–June.

9. *Phacelia distans* Benth. Common *Phacelia*. Fig. 4068.

Phacelia distans Benth. Bot. Sulph. 36. 1844.

Phacelia tanacetifolia var. *tennifolia* Torr. Bot. Mex. Bound. 143. 1859.

Phacelia scabrella Greene, Pittonia 1: 35. 1887.

Phacelia Arthuri Greene, op. cit. 224. 1888.

Phacelia leptostachys Greene, Erythraea 2: 190. 1894.

Phacelia commixta Greene, Pittonia 5: 21. 1902.

Phacelia amphiola Greene ex Brand, Univ. Calif. Pub. Bot. 4: 216. 1912.

Phacelia distans var. *australis* Brand, loc. cit.

Annual, 2–12 dm. tall from a taproot, hispidulous or scabrous throughout, the leaves appressed-hirsute, the inflorescence densely short-pubescent and hispid; stems ascending, prostrate, or erect, branching or simple. Basal leaves oblong-oval to broadly ovate, 4–12 cm. long, 2.5–9 cm. broad, 1–2-pinnate, the oblong or lanceolate divisions toothed, incised, or pinnatifid, the petiole usually much shorter than the blade; cauline leaves like the basal, but short-petiolate or sessile; flowers numerous, short-pedicellate, in scattered, simple or few-branched cymes, the cymes 2–12 cm. long, erect in fruit; calyx-lobes narrowly lanceolate or oblanceolate to obovate, frequently unequal, 4–6 mm. long, 0.5–3 mm. broad, densely pubescent and hispid, a little enlarged in fruit; corolla cream, bluish white, or purplish blue, broadly campanulate, deciduous, 6–12 mm. long and broad, the lobes obovate, 3–5 mm. long, the whole exceeding the calyx; stamens a little longer than the corolla or sometimes included, 8–13 mm. long, the filaments glabrous, the anthers oblong-oval, about 0.8 mm. long; scales semi-ovate, free at apex; style a little longer than the corolla, 7–12 mm. long, glabrous, cleft three-fourths; capsule globose, 2–3 mm. long, hispid; seeds 2–4, oblong-oval, 2–3 mm. long, brown, coarsely foveolate.

Hill slopes and sand dunes, Transition and Sonoran Zones; throughout central and southern California, south to Lower California and east to Nevada and Arizona. Type locality: Bodega, California. April–June.

Phacelia umbrōsa Greene, Erythraea 2: 191. 1894. Plants slender and weak, the branches up to 3 dm. long, sparsely hirsutulous to nearly glabrous; leaves ovate, 3–8 cm. long, pinnate or pinnatifid into 5 shallowly lobed or crenate divisions or leaflets, at least the lower petiolulate; cymes dense but slender and elongate; calyx-lobes linear, hispid, unequal; corolla pale bluish lilac or violet to white, tubular-campanulate, 3–6 mm. long, not exceeding the calyx; scales united below, dilated above; seeds usually 4, papillate. A little-known species of Lower California, which has been reported in the southwestern Colorado Desert. Type locality: northern Lower California.

10. *Phacelia platylōba* A. Gray. Broad-lobed *Phacelia*. Fig. 4069.

Phacelia platylōba A. Gray, Proc. Amer. Acad. 17: 223. 1882.

Annual, 1.5–5 dm. tall from a slender taproot, glandular-puberulent and hirsute throughout, but especially in the inflorescence; stems slender, simple or branching. Lower leaves oblong, 3–8 cm. long, 1–4 cm. broad, pinnate, the remote, oblong divisions pinnatifid, the petiole slender, usually shorter than the blade; cauline leaves like the basal; flowers rather few, short-pedicellate in panicles of loose or dense, simple or few-branched cymes, the cymes 2–6 cm. long, erect in fruit; calyx-lobes dimorphic: (a) 3, lanceolate to narrowly spatulate, entire, 2–3 mm. long, 0.5–1 mm. broad, (b) 2, broadly ovate, petiolulate, entire or crenate, 2–3 mm. long and broad, all hirsute, little enlarged in fruit; corolla light blue or lavender, broadly campanulate, deciduous, 4–5 mm. long and broad, the lobes oval, 1.5–2 mm. long, the whole a little longer than the calyx; stamens equaling or a little longer than the corolla, the filaments glabrous, 3–4 mm. long, the anthers oblong-oval, about 0.5 mm. long; scales oblong, subcordate above; style exserted, about 5 mm. long, glabrous, cleft two-thirds; capsule cylindrical, 2–2.5 mm. long, acute, shorter than the calyx, indehiscent; seed usually solitary, lanceolate, 2–2.5 mm. long, dark brown, finely foveolate.

Light shade, Sonoran Zones; Sierra Nevada foothills, Mariposa County to Fresno County, California. Type locality: "Fresno Co.," California. April–June.

11. *Phacelia tanacetifōlia* Benth. Tansy *Phacelia*. Fig. 4070.

Phacelia tanacetifolia Benth. Trans. Linn. Soc. 17: 280. 1835.

Phacelia tanacetifolia var. *cinerea* Brand, Univ. Calif. Pub. Bot. 4: 216. 1912.

Phacelia tanacetifolia var. *pseudo-distans* Brand, Pflanzenreich 4²⁰¹: 91. 1913.

Annual, 2–12 dm. tall from a taproot, hispidulous or scabrous and sparsely hispid throughout, the inflorescence densely short-pubescent and hispid; stems ascending or erect, branching or simple. Basal leaves oblong-oval to ovate, 6–20 cm. long, 3–15 cm. broad, pinnate, the oblong to lanceolate divisions pinnatifid or incised, the petiole usually much shorter than the blade; cauline leaves like the basal but shorter-petiolate or sessile; flowers numerous, short-pedicellate in dense, corymbosely branched, approximate, and pedunculate cymes, the cymes 4–12 cm. long, erect in fruit; calyx-lobes linear to linear-lanceolate, 4–6 mm. long, 0.3–1 mm. broad, acute, densely pubescent and hispid, scarcely enlarged in fruit; corolla bluish purple, broadly campanulate, tardily deciduous, 7–10 mm. long and broad, the lobes oval, 2.5–3 mm. long, the whole longer than the calyx; stamens exserted, 9–14 mm. long, the filaments glabrous, the anthers oblong-oval, about 0.75 mm. long, cleft three-fourths; scales usually wholly adnate; capsule broadly ovoid, 3–4 mm. long, obtuse, hispidulous at apex; seeds usually 2, oblong, 2–3 mm. long, dark brown, coarsely rugose.

Open flats and slopes, Transition and Sonoran Zones; central valley and deserts of California, to Arizona and Lower California; widely escaped in grainfields. Type locality: "California." Collected by Douglas. March–May.

12. *Phacelia cicutària* Greene. Caterpillar *Phacelia*. Fig. 4071.

Phacelia cicutaria Greene, Pittonia 5: 20. 1902.

Phacelia heterosepala Greene, op. cit. 21.

Annual, 2–6 dm. tall from a slender taproot, densely hispid and hispidulous throughout, and somewhat glandular; stems simple or branched, erect or ascending. Lower leaves alternate, oblong-ovate to ovate, 4–10 cm. long, 2.5–5 cm. broad, pinnate, the usually 5–9 oblong to ovate-lanceolate divisions incised or toothed, the petiole slender, usually shorter than the blade; cauline leaves like the basal, but shorter-petiolate; flowers numerous, short-pedicellate in dense, few-branched cymes, the cymes 5–15 cm. long, erect in fruit; calyx-lobes linear or slightly dilated at apex, 6–8 mm. long, 0.5–1 mm. broad, densely bristly-hispid, up to 1 cm. long in fruit; corolla yellowish white, broadly campanulate, deciduous, 8–12 mm. long and broad, the lobes obovate, 4–5 mm. long, the whole longer than the calyx; stamens about equaling the corolla or slightly exserted, 8–12 mm. long, the filaments glabrous, the anthers oblong, about 1 mm. long; scales conspicuous, the free portion oval; style about as long as the stamens, cleft about to the middle; capsule ovoid-globose, 3–4 mm. long, sparsely hispid; seeds 2–4, 2.5–3 mm. long, dark brown, coarsely foveolate.

Rocky stream banks, Transition Zone; Sierra Nevada foothills from Butte County to Kern County, California. Type locality: Knights Ferry on the Stanislaus River. March–May.

Phacelia cicutaria var. *hispidà* (A. Gray) J. T. Howell, Leaflets West. Bot. 3: 120. 1942. (*Phacelia ramosissima* var. *hispidà* A. Gray, Proc. Amer. Acad. 10: 319. 1875; *P. hispidà* A. Gray, Syn. Fl. N. Amer. 2¹: 161. 1878. Not Buckl. 1862; *P. eximia* Eastw. Bull. Torrey Club 32: 204. 1905; *P. hispidà* var. *heliophila* J. F. Macbride, Contr. Gray Herb. No. 49:29. 1917.) Plants usually widely branched; leaves merely incised to pinnate and the divisions incised; inflorescence paniculately branched and rather lax; calyx-lobes conspicuously dilated; flowers longer-pedicellate; corolla lavender; scales wholly adnate; capsule globose, 3 mm. long; seeds usually 4, 1.5–2 mm. long. Coast Ranges of central California, throughout cismontane southern California to Lower California. Type locality: Mount Wilson, California.

Phacelia cicutaria var. *Hübbyi* (J. F. Macbride) J. T. Howell, Leaflets West. Bot. 3: 120. 1942. (*Phacelia hispidà* var. *Hübbyi* J. F. Macbride, Contr. Gray Herb. No. 49:29. 1917; *P. tanacetifolia* var. *Hübbyi* Jepson & Hoover in Jepson, Fl. Calif. 3: 258. 1943.) Inflorescence shaggy-hirsute, the cymes dense. Santa Barbara County to northern Los Angeles County, California. Type locality: Ojai Valley, Ventura County.

13. *Phacelia cryptantha* Greene. Limestone *Phacelia*. Fig. 4072.

Phacelia hispidà var. *brachyantha* Coville, Contr. U.S. Nat. Herb. 4: 158. 1893.

Phacelia cryptantha Greene, Pittonia 5: 21. 1902.

Phacelia eremica Jepson, Man. Fl. Pl. Calif. 823. 1925.

Phacelia cryptantha var. *derivata* Voss, Bull. S. Calif. Acad. 33: 174. 1935.

Annual, 1–5 dm. tall from a slender taproot, short-glandular-pubescent and hispid, the inflorescence densely hispid; stems branching widely, erect or ascending, forming low, rounded tufts. Lower leaves alternate, oblong-oval, 3–9 cm. long, 1.5–5 cm. broad, pinnate or pinnatifid, the usually 7–11 divisions oblong to oval, remote, toothed, the slender petiole usually shorter than the blade; cauline leaves like the basal; flowers numerous, on short but slender pedicels, in lax, simple or few-branched cymes, the cymes 2–10 cm. long, erect in fruit; calyx-lobes linear-oblancoate (a filiform claw but broadly dilated above), 4–7 mm. long, 0.5–1 mm. broad, up to 10 mm. long, 1.5 mm. broad in fruit, hispid; corolla lavender, campanulate-funneliform, deciduous, 4–7 mm. long, 3–4 mm. broad, the lobes obovate, 2–3 mm. long, the whole about as long as the calyx; stamens included, 3–4 mm. long, the filaments glabrous, the anthers oval, about 0.5 mm. long; scales adnate, inserted in the upper part of the tube, with or without a free, acute tip; style included, 3–4 mm. long, hispid at base, cleft more than one-half; capsule globose, 2 mm. long, hispid; seeds 4, ovoid, 1.5–2.5 mm. long, dark brown, foveolate.

Moist canyons of arid desert ranges, Sonoran Zones; Death Valley and Mojave and Colorado Deserts, California, to Nevada and Arizona. Type locality: Surprise Canyon, Panamint Mountains, Inyo County, California. April–May.

14. *Phacelia vallis-mórtæ* Voss. Death Valley *Phacelia*. Fig. 4073.

Phacelia vallis-mortæ Voss, Bull. S. Calif. Acad. 33: 175. 1935.

Annual, 1–4 dm. tall from a slender taproot, sparsely hispid, and glandular-pubescent throughout; stems weak, reclining, branching. Lower leaves alternate, oblong-ovate, 3–6 cm. long, 2–5 cm. broad, pinnate, the 7–9 oblong or lanceolate divisions incised, toothed, or entire, the petiole slender, usually shorter than the blade; cauline leaves like the basal but shorter-petiolate; flowers rather few, short-pedicellate in few-branched or simple cymes, the cymes 2–6 cm. long, erect in fruit; calyx-lobes linear-oblancoate, 4–6 mm. long, 0.5–1 mm. broad, densely bristly-hispid, up to 1 cm. long in fruit; corolla lavender, broadly campanulate, deciduous, 6–10 cm. long, 8–12 mm. broad, the lobes obovate, 4–5 mm. long, the whole longer than the calyx; stamens shorter than to about equaling the corolla, 4–8 mm. long, the filaments glabrous, the anthers oblong, about 1 mm. long; scales conspicuous, with slender, free tips, the transverse portion inconspicuous; style about equaling the corolla, 6–10 mm. long, parted to below the middle; capsule ovoid-globose, 3–3.5 mm. long, hirsutulous; seeds usually 4, ovoid, about 3 mm. long, brown, foveolate.

Among desert shrubs, Sonoran Zones; desert regions of southeastern California to southern Utah and northern Arizona. Type locality: Keene's Spring, Amargosa Range, Death Valley, California. April–June.

15. *Phacelia malvaefòlia* Cham. Stinging *Phacelia*. Fig. 4074.

Phacelia malvaefolia Cham. Linnaea 4: 494. 1829.

Eutoca loasaefolia Benth. Trans. Linn. Soc. 17: 277. 1835.

Phacelia loasaefolia Torr. Bot. Mex. Bound. 143. 1859.

Annual, 3–9 dm. tall from a taproot, densely bristly-hispid and finely pubescent throughout;



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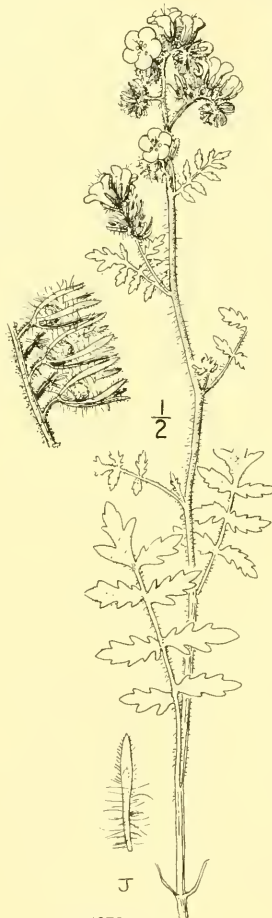
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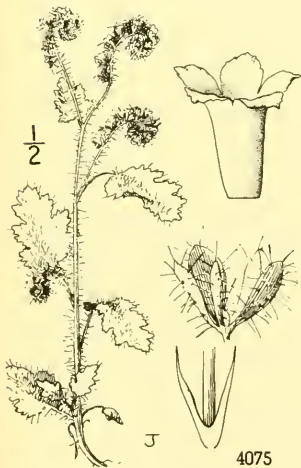
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4069. *Phacelia platyloba*
4070. *Phacelia tanacetifolia*
4071. *Phacelia cicutaria*

4072. *Phacelia cryptantha*
4073. *Phacelia vallis-mortae*
4074. *Phacelia malvaefolia*

4075. *Phacelia Rattanii*
4076. *Phacelia ciliata*

stems weak, diffuse, simple or branching. Basal leaves ovate to deltoid, 3–8 cm. long, 2–6 cm. broad, shallowly lobed, the lobes serrate, sometimes a small pair of discrete leaflets occurs at the base, the petiole equaling or shorter than the blade; cauline leaves like the basal; flowers rather numerous, subsessile in short, dense, solitary or geminate, scattered cymes, the cymes 2–10 cm. long, erect in fruit; calyx-lobes spatulate, 4–6 cm. long, 1–3 mm. broad, unequal, densely hispid, little enlarged in fruit; corolla dull white, broadly campanulate, deciduous, 5–7 mm. long and broad, the lobes obovate, 2–3 mm. long, the whole longer than the calyx; stamens exserted, 5–10 mm. long, the filaments glabrous, the anthers oval, about 0.8 mm. long; scales semi-ovate, free at apex; style exserted, 8–12 mm. long, hispidulous, cleft three-fourths; capsule globose, 2–3 mm. long, hispid; seeds 2–6, oblong-ovoid, carinate, 2–2.5 mm. long, nearly black, foveolate.

Bluffs and woods, Transition Zone; coastal, from southwestern Oregon to San Luis Obispo County, California. Type locality: San Francisco. April–June.

16. *Phacelia Rattánii* A. Gray. Rattan's *Phacelia*. Fig. 4075.

Phacelia Rattánii A. Gray, Proc. Amer. Acad. 20: 302. 1885.

Phacelia flaccida Elmer, Bot. Gaz. 41: 323. 1906.

Annual, 1–6 dm. tall from a taproot, sparsely bristly-hispid and finely pubescent throughout; stems weak, diffuse, simple or branching. Basal leaves oval or ovate, 2.5–10 cm. long, 1.5–8.5 cm. broad, shallowly lobed, the lobes crenate or dentate, the petiole about equaling the blade; cauline leaves like the basal; flowers few, pedicellate, in lax, scattered, short cymes, the cymes 2–6 cm. long, erect in fruit; calyx-lobes spatulate, 3–4 mm. long, 1–2 mm. broad, unequal, somewhat enlarged in fruit; corolla white or bluish, narrowly campanulate, deciduous, 4–5 mm. long, 2–4 mm. broad, the lobes oval, 1–1.5 mm. long, the whole slightly exceeding the calyx; stamens included, 2–3 mm. long, the filaments pubescent, the anthers globose-oval, 0.3 mm. long; scales lanceolate, entire, wholly adnate; style included, 2–3 mm. long, glabrous, cleft about to the middle; capsule globose, 2–2.5 mm. long, pubescent; seeds usually 2, oblong-ovoid, 2 mm. long, scarcely carinate, dark brown, rather coarsely foveolate.

Brushy slopes and stream banks, Transition Zone; southwestern Oregon, east to southwestern Idaho and south to northern and central California. Type locality: Lake County and northward in California. May–July.

17. *Phacelia ciliata* Benth. Great Valley *Phacelia*. Fig. 4076.

Phacelia ciliata Benth. Trans. Linn. Soc. 17: 280. 1835.

Phacelia acanthominthoides Elmer, Bot. Gaz. 41: 309. 1906.

Phacelia ciliata var. *opaca* J. T. Howell, Leaflets West. Bot. 1: 221. 1936.

Annual, 1.5–6 dm. tall from a slender taproot, hispidulous throughout, the inflorescence hispid; stems numerous, ascending, branching. Basal leaves oblong or ovate, 4–10 cm. long, 1.5–4 cm. broad, pinnate or pinnatifid, the oblong divisions toothed or incised, the petiole usually much shorter than the blade; cauline leaves like the basal but short-petiolate or sessile; flowers rather numerous, subsessile in terminal clusters of solitary or geminate cymes, the cymes simple or few-branched, 3–10 cm. long, erect or spreading in fruit; calyx-lobes broadly lanceolate, 4–6 mm. long, 1–2 mm. broad, densely hispid-ciliate, in fruit ovate, subcoriaceous, scarious (rarely opaque), and venulous, loosely enveloping the mature capsule, 8–10 mm. long, 2–5 mm. broad; corolla bright blue with a paler center, pelviform, deciduous, 8–12 mm. long and broad, the lobes obovate, 3–6 mm. long, the whole much longer than the calyx; stamens about as long as the corolla or a little exserted, 9–13 mm. long, the filaments glabrous, the anthers oval, 1 mm. long; scales suborbicular, partly free, spreading; style 6–8 mm. long, puberulent at base, cleft three-fourths; capsule globose-ovoid, 4–5 mm. long, hispidulous, mucronate; seeds usually 4, cylindrical-oblong, 2.5–3.5 mm. long, dark brown, foveolate.

Gravelly slopes and cultivated fields, Sonoran Zones; San Joaquin Valley, California, to Lower California; widely spread throughout the Sacramento Valley and elsewhere in grainfields and orchards. Type locality: "California." Collected by Douglas. March–May.

18. *Phacelia thermàlis* Greene. Hot Spring *Phacelia*. Fig. 4077.

Phacelia thermalis Greene, Erythra 3: 66. 1895.

Phacelia firmomarginata A. Nels. Bot. Gaz. 54: 143. 1912.

Annual, 0.5–3 dm. tall from a taproot, thinly short-pubescent and somewhat hispid, especially in the inflorescence; stems few to numerous, ascending, branching from base. Basal leaves oblong to ovate, 3–6 cm. long, 1–3 cm. broad, pinnate or pinnatifid (sometimes lyrate pinnatifid), the oblong to obovate divisions crenate-dentate, the petiole usually much shorter than the blade; cauline leaves like the basal; flowers rather numerous, subsessile in dense cymes, the cymes simple or few-branched, 3–15 cm. long, erect in fruit; calyx-lobes lanceolate, 3–5 mm. long, 1–2 mm. broad, densely hispid-ciliate, in fruit oblong-lanceolate, subcoriaceous and venulous, ultimately more or less scarious, 7–9 mm. long, 2–3 mm. broad; corolla white or pale blue, campanulate-funnelform, deciduous, 3–4 mm. long, 2–3 mm. broad, the lobes obovate, 1–1.5 mm. long, the whole about as long as the calyx; stamens included, 1.5–2 mm. long, the filaments glabrous, the anthers oval, 0.25 mm. long; scales oblanceolate, adnate; style included, about 2 mm. long, cleft two-thirds; capsule globose-ovoid, 3–4 mm. long, pubescent; seeds usually 4, cylindrical-oblong, 2–2.5 mm. long, dark brown, foveolate.

Moist soil of hillsides, Transition Zone; southeastern Oregon and adjacent Idaho to northeastern California. Type locality: Little Hot Springs Valley, Modoc County, California. June–July.

19. *Phacelia crenulata* Torr. Heliotrope Phacelia. Fig. 4078.

Phacelia crenulata Torr. ex S. Wats. Bot. King. Expl. 251. 1871.

Phacelia ambigua M. E. Jones, Contr. West. Bot. No. 12:52. 1908.

Phacelia crenulata var. *vulgaris* Brand, Pflanzenreich 4²⁵¹: 78. 1913.

Phacelia crenulata var. *funerea* Voss ex Munz, Man. S. Calif. 409, 600. 1935.

Annual or biennial, 1.5–15 dm. tall from a taproot, glandular-pubescent throughout and more or less hirsute or hispid; stems simple or branched. Basal leaves alternate, oblong to oval, 3–12 cm. long, 1.5–5 cm. broad, pinnate or pinnately lobed, the lobes oval, crenate to lobed; cauline leaves like the basal; flowers numerous, short-pedicellate in corymbose or paniculate clusters of dense cymes, the cymes 5–10 cm. long, erect in fruit; calyx-lobes oblanceolate to oval, 4–6 mm. long, 1–1.5 mm. broad, glandular-hispid; corolla violet or bluish purple, broadly campanulate, deciduous, 4–10 mm. long and broad, the lobes obovate, 3–5 mm. long, crenulate; stamens exserted, 10–14 mm. long, the filaments glabrous, the anthers oblong, 0.75 mm. long; scales lunate to rectangular, adnate; style exserted, 12–15 mm. long, cleft about two-thirds; capsule globose-ovoid, 3–4 mm. long; seeds usually 4, oblong-ovoid, 3–3.5 mm. long, thick, the ventral surface excavated on each side of a salient ridge, foveolate and transversely corrugated.

Rocky slopes, Sonoran Zones; southeastern California to Lower California east to Nevada, Utah and Arizona. Type locality: Trinity Mountains, Nevada. March–May.

Phacelia minutiflora Voss ex Munz, Man. S. Calif. 409, 600. 1935. Plants smaller throughout; corolla yellowish white, 3–4 mm. long and broad; stamens less exserted. San Diego and Imperial Counties, California, to northern Lower California. Type locality: Cargo Muchacho Mountains, Imperial County, California.

20. *Phacelia amabilis* Constance. Saline Valley Phacelia. Fig. 4079.

Phacelia amabilis Constance, Madroño 7: 56. pl. 3. 1943.

Annual or biennial, about 1 m. tall from a taproot, glandular-puberulent and hispid throughout; stems erect, branching. Basal leaves alternate, oblong to oblong-ovate, 8–15 cm. long, 3–5 cm. broad, pinnatifid, the lobes oblong, dentate; cauline leaves like the basal; flowers numerous, short-pedicellate in corymbose clusters of cymes 5–12 cm. long, erect in fruit; calyx-lobes lanceolate, 3–5 mm. long, 1–2 mm. broad, glandular-hispid; corolla white, broadly campanulate, deciduous, 7–8 mm. long, 8–12 mm. broad, the lobes obovate, 3–4 mm. long; stamens exserted, 9–15 mm. long, the filaments glabrous, the anthers oblong, about 1 mm. long; scales with a broad free portion; style exserted, about 1 cm., divided about to the middle; capsule ovoid, 3–4 mm. long; seeds usually 2 or 4, oblong-ovoid, 3–4 mm. long, pale, thin and broadly flanged, the ventral surface excavated on each side of a salient ridge, foveolate but not corrugated.

Creek banks, Sonoran Zones; known only from the type collection: Saline Valley, Inyo County, California. April–May.

21. *Phacelia pedicellata* A. Gray. Pedicellate Phacelia. Fig. 4080.

Phacelia pedicellata A. Gray, Syn. Fl. N. Amer. 2¹: 160. 1878.

Annual, 1.5–4 dm. tall from a taproot, glandular-hirsute throughout; stems usually branched. Basal leaves alternate, oval, 6–12 cm. long, 4–10 cm. broad, pinnate or pinnatifid, the lobes often petiolulate, dentate or lobed; cauline leaves like the basal; flowers numerous, slender-pedicellate in branched, paniculate clusters of compact cymes, the cymes 3–5 dm. long, erect in fruit and the filiform pedicels deflexed; calyx-lobes oblanceolate, 3–4 mm. long, 1–1.5 mm. broad, glandular-hirsute, scarious and up to 5 mm. long in fruit; corolla blue or purplish to white, broadly campanulate, deciduous, 4–6 mm. long and broad, the lobes obovate, 1–1.5 mm. long, the whole exceeding the calyx; stamens exserted, 6–8 mm. long, the filaments glabrous, the anthers oblong, 0.6 mm. long; scales lunate to rectangular, often auriculate at base, adnate; style 6–8 mm. long, glabrous, cleft about to the middle; capsule ovoid, 3–3.5 mm. long; seeds 4, oblong-ovoid, 2.5–3 mm. long, thick, the ventral surface excavated on each side of a salient ridge, foveolate and transversely corrugated.

Desert canyons and washes, Sonoran Zones, southeastern California to Lower California and Arizona. Type locality: "Lower California." March–May.

22. *Phacelia Anelsonii* J. F. Macbride. Aven Nelson's Phacelia. Fig. 4081.

Phacelia Anelsonii J. F. Macbride, Contr. Gray Herb. No. 49: 26. 1917.

Annual, 2–4 dm. tall from a taproot, viscid-pubescent throughout; stems simple, erect. Basal leaves alternate, oblong to oblanceolate, 2–10 cm. long, 1–2 cm. broad, pinnately lobed or divided, the lobes crenate; cauline leaves like the basal, reduced; flowers numerous, short-pedicellate in a thyrsoid cluster of cymes, the cymes 1.5–3 cm. long, erect and compact in fruit; calyx-lobes oblanceolate, 3–4 mm. long, 1–1.5 mm. broad, glandular-puberulent; corolla blue or violet, broadly campanulate, deciduous, 6 mm. long and broad, exceeding the calyx; stamens included; scales lunate, narrower at top than at bottom; style included; capsule ovoid, 2.5–3 mm. long; seeds 2–4, oblong-ovoid, 3–3.5 mm. long, thin, the ventral surface excavated on each side of a salient ridge, foveolate but not corrugated.

Rocky soil, Sonoran Zones; southeastern California to southern Nevada, and Utah. Type locality: Meadow Valley Wash, Nevada. March–May.

23. *Phacelia coerulea* Greene. Sky-blue Phacelia. Fig. 4082.

Phacelia coerulea Greene, Bull. Torrey Club 8: 122. 1881.

Phacelia invenusta A. Gray, Proc. Amer. Acad. 20: 303. 1885.

Annual, 1–4 dm. tall from a taproot, glandular-hispid throughout; stems simple or few-

branched, slender, erect. Basal leaves alternate, oblong-ovate to ovate, 3–8 cm. long, 1–2.5 cm. broad, pinnately lobed or divided; cauline leaves like the basal, the upper sinuate; flowers few to numerous, subsessile in loosely paniculate cymes, the cymes 5–10 cm. long, spreading in fruit; calyx-lobes lanceolate to narrowly ovate, 2–3 mm. long, 1–1.5 mm. broad, glandular-hispid; corolla blue or white, broadly campanulate, deciduous, 3–4 mm. long and broad, the lobes obovate, 1–2 mm. long; stamens included, 2–3 mm. long, the filaments glabrous, the anthers oblong, 0.3 mm. long; scales lunate, often auriculate at summit; style included, 2–3 mm. long, cleft about two-thirds; capsule ovoid, 2–3 mm. long; seeds 4, ovoid, 2.5–3 mm. long, thick, the ventral surface excavated on each side of a salient ridge, foveolate and transversely corrugated.

Rocky slopes, Sonoran Zones; southeastern California and adjacent Nevada to Texas and Chihuahua. Type locality: southern New Mexico and Arizona. March–May.

24. *Phacelia imbricata* Greene. Imbricate *Phacelia*. Fig. 4083.

Phacelia circinata var. *calycosa* A. Gray, Proc. Amer. Acad. 10: 317. 1875.

Phacelia imbricata Greene, Erythea 1: 127. 1893.

Phacelia stimulans Eastw. Proc. Calif. Acad. 111. 2: 291. 1902.

Phacelia imbricata var. *condensata* Brand, Univ. Calif. Pub. Bot. 4: 220. 1912.

Phacelia imbricata var. *caudata* Brand, loc. cit.

Phacelia imbricata subvar. *Hansenii* Brand, loc. cit.

Perennial, 2–6 dm. tall from a branched caudex, hirsutulous and densely appressed-hispid throughout, the foliage green or grayish green; stems several to numerous, ascending, simple. Lower leaves linear-lanceolate to ovate-lanceolate, 5–13 cm. long, 1–6 cm. broad, pinnate or pinnatifid, the terminal leaflet much larger than the several pairs of lateral leaflets, all acute or acuminate and prominently veined, the petiole slender, densely hispid, equaling or exceeding the blade; flowers numerous in dense, loosely racemose cymes, the cymes 2–12 cm. long, ascending in fruit; calyx-lobes broadly lanceolate to obovate, often unequal, 3–4 mm. long, 1.5–3 mm. broad, hirsute to hispid-ciliate, but green on the back, 5–10 mm. long, 1.5–4 mm. broad and imbricate laterally in fruit; corolla white, 4–7 mm. long, 4–6 mm. broad, the lobes enfolding the stamens after anthesis; stamens 9–13 mm. long, the filaments pubescent near the middle and often above, the anthers 0.6–0.8 mm. long; style 9–14 mm. long, pubescent toward the base; capsule lance-ovoid, 3–4 mm. long, acuminate, hispid; seeds usually solitary, oblong-ovoid, 2–2.5 mm. long, brown.

Rocky open slopes, Sonoran and Transition Zones; Coast Ranges and Sierra Nevada foothills of California, from Humboldt and Shasta Counties to Fresno, Ventura, and San Bernardino Counties. Type locality: "wooded hills of Napa and Sonoma counties, California." April–June.

NOTE: Species No. 24 to 32, inclusive, are members of a polyploid complex (Cave & Constance, Univ. Calif. Pub. Bot. 18: 205–216. 1942; 293–298. 1944; 449–465. 1947.) in which satisfactory taxonomic units have not as yet been delimited.

25. *Phacelia californica* Cham. California *Phacelia*. Fig. 4084.

Phacelia californica Cham. Linnaea 4: 494. 1829.

Phacelia magellanica f. *Jepsonii* Brand, Pflanzenreich 4²⁵¹: 100. 1913.

Perennial, 2.5–9 dm. tall from a branched caudex, short-pilose and more or less hirsute or hispid throughout, the inflorescence densely and softly white-hirsute, the foliage green or greenish; stems several, ascending or erect, simple. Lower leaves ovate, 5–15 cm. long, 2–7 cm. broad, pinnate or pinnatifid, the terminal leaflets much longer than the lateral, all acute or obtuse, prominently veined, the petiole stout, equaling or shorter than the blade; flowers numerous in dense, racemose or somewhat capitate cymes, the cymes 2–7 cm. long, spreading in fruit; calyx-lobes lanceolate, 3–5 mm. long, 1–2 mm. broad, densely hirsute-ciliate, 7–8 mm. long, 2–2.5 mm. broad, unequal but scarcely imbricate in fruit; corolla usually lavender, 5–6 mm. long and broad; stamens 7–10 mm. long, the filaments pubescent above the middle, the anthers 0.6–0.8 mm. long; style 8–12 mm. long, pubescent below; capsule lance-ovoid, 3–4 mm. long, acuminate, hispid; seeds 1 or 2, oblong-ovoid, 2–2.5 mm. long, dark brown.

Rocky banks and slopes, Transition Zones; coast and Coast Ranges from Mendocino County to Santa Clara County, California. Type locality: San Francisco. April–August.

Phacelia egēna Greene ex Brand, Univ. Calif. Pub. Bot. 4: 218. 1912. (*Phacelia magellanica* f. *egēna* Brand, loc. cit.). Branches several to numerous, ascending; leaves usually pinnatifid, with acute divisions; calyx-lobes narrowly lanceolate, 4–6 mm. long, 1–1.5 mm. broad, hirsute, in fruit 8–10 mm. long, 1.5–2 mm. broad; corolla white, 7–9 mm. long, 6–9 mm. broad. Inner North Coast Ranges and Sierra Nevada foothills, from Humboldt and Siskiyou Counties to Ventura and Kern Counties, California. Type locality: Kaweah River, Tulare County.

Phacelia californica var. *bernardina* (Greene) Jepson, Man. Fl. Pl. Calif. 820. 1925. (*Phacelia virgata* var. *bernardina* Greene, Erythea 4: 55. 1896.) Stems tall and stout, usually solitary, erect; inflorescence large and virgate, densely tawny-hirsute to white-hispid; calyx-lobes oblanceolate to ovate; corolla white. Mountains of southern California, especially the San Bernardino Mountains. Type locality: mountains near San Bernardino.

Phacelia californica var. *pátula* (Brand) Jepson, Man. Fl. Pl. Calif. 820. 1925. (*Phacelia magellanica* f. *pátula* Brand, Univ. Calif. Pub. Bot. 4: 219. 1912.) Depressed, the short branches prostrate or ascending; basal leaves densely rosulate, entire or with a few basal lobes, densely whitish-hispid; inflorescence congested; calyx-lobes lanceolate to obovate; corolla white. High altitudes in the mountains of southern California, from Los Angeles County to San Diego County. Type locality: Stonewell Mine, Cuyamaca Mountains, San Diego County.

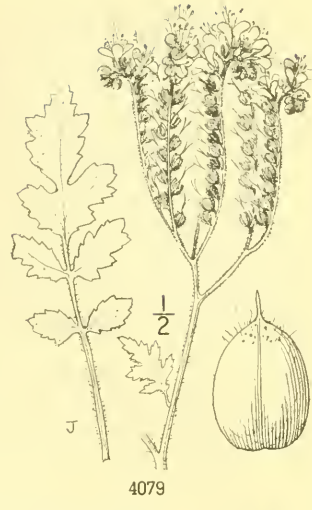
Phacelia californica var. *jacintensis* Dundas, Bull. S. Calif. Acad. 33: 160. 1935. Stems slender, few, nearly naked; leaves narrowly oblong, densely hispid; inflorescence narrowly racemose and rather few-flowered; corolla usually lavender. San Gabriel, San Bernardino, and San Jacinto Mountains, southern California, at high altitudes. Type locality: Tahquitz Valley, San Jacinto Mountains.



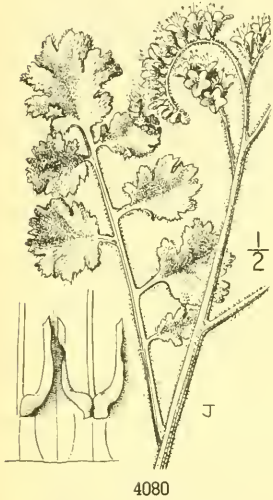
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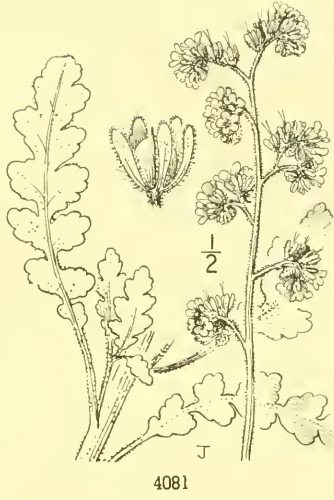
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4077. *Phacelia thermalis*
4078. *Phacelia crenulata*
4079. *Phacelia amabilis*

4080. *Phacelia pedicellata*
4081. *Phacelia Anelsonii*
4082. *Phacelia coerulea*

4083. *Phacelia imbricata*
4084. *Phacelia californica*
4085. *Phacelia argentea*

26. *Phacelia argentea* Nels. & Macbr. Sand Dune Phacelia. Fig. 4085.

Phacelia argentea Nels. & Macbr. Bot. Gaz. 61: 34. 1916.

Phacelia heterophylla var. *rotundata* Dundas, Bull. S. Calif. Acad. 33: 156. 1935.

Perennial, 1–3 dm. tall from a branched caudex, densely hirsutulous and appressed-hispid throughout, the foliage silvery, the inflorescence softly hirsute; stems several, stout, prostrate or ascending, simple. Leaves thick, the lower rosulate, oval to suborbicular, 2–5 cm. long, 2–4 cm. broad, entire or with a pair of much smaller lobes at the base, obtuse, the parallel lateral veins deeply impressed above, the stout petiole usually shorter than the blade; flowers numerous in dense corymbose or subcapitate cymes, the cymes 2–4 cm. long, ascending in fruit; calyx-lobes oblong to oval, 3–4 mm. long, 1–2 mm. broad, densely hirsute, glistening, a little enlarged in fruit; corolla yellowish white, 5–6 mm. long and broad; stamens 6–8 mm. long, the filaments pubescent, the anthers 0.5 mm. long; style 6–8 mm. long, pubescent below; capsule ovoid, about 3 mm. long, acute, hirsute; seeds 1 or 2, ovoid, 1.5–2 mm. long, brown.

Coastal sand dunes, Humid Transition Zone; Coos County, Oregon, to Del Norte County, California. Type locality: Chetco, Oregon. June–Aug.

27. *Phacelia heterophylla* Pursh. Virgate Phacelia. Fig. 4086.

Phacelia heterophylla Pursh, Fl. Amer. Sept. 140. 1814.

Phacelia virgata Greene, Erythraea 4: 54. 1896.

Phacelia virgata var. *ampliata* Greene, op. cit. 55.

Phacelia californica f. *vinetensis* J. F. Macbride, Contr. Gray Herb. No. 49: 37. 1917.

Biennial (or weakly perennial), 3–12 dm. tall from a branched taproot, densely short-pilose and appressed-hispid throughout, the foliage grayish green; stem usually simple, solitary, and erect, or numerous supplementary shorter stems arising at its base. Lower leaves lanceolate to ovate, 5–9 cm. long, 1.5–5 cm. broad, pinnate (rarely all entire), the terminal leaflet much larger than the pairs of lateral leaflets, prominently veined, the petiole rather stout, about equaling the blade; cauline leaves reduced upwards, at least the uppermost entire; flowers numerous in a dense thyrsus of short cymes, the cymes 1–5 cm. long, ascending in fruit; calyx-lobes linear to linear-oblong, 3–4 mm. long, 0.5–1 mm. broad, densely yellowish-pilose and hirsute-ciliate, in fruit 6–10 mm. long, 1–1.5 mm. broad; corolla yellowish or greenish white, 4–5 mm. long and broad; stamens 8–10 mm. long, the filaments pubescent above the middle, the anthers 0.5–0.7 mm. long; style 8–10 mm. long, puberulent toward the base; capsule ovoid, 2.5–3 mm. long, hispid, acuminate; seeds 1 or 2, ovoid or oblong-ovoid, 2 mm. long, brown.

Rocky open places or in pine woods, Transition Zone; Montana and northwestern Wyoming to eastern Washington and western Oregon, south to Mendocino County and Lake Tahoe, California, east to Idaho, Wyoming, and Utah. Type locality: "On dry hills on the banks of the Kooskoosky" (Clearwater River, Idaho). May–July.

28. *Phacelia leucophylla* Torr. Silverleaf Phacelia. Fig. 4087.

? *Phacelia hastata* Dougl. ex Lehm. Stirp. Pug. 2: 20. 1830.

Phacelia leucophylla Torr. ex Frem. Rep. 75. 1845.

Phacelia canescens Nutt. Journ. Acad. Phila. 1: 159. 1848.

Phacelia Burkei Rydb. Bull. Torrey Club 36: 675. 1909.

Phacelia magellanica f. *angustifolia* Brand, Pflanzenreich 4²²¹: 98. 1913.

Perennial, 2–5 dm. tall from a branched caudex, canescent and appressed-hirsute or somewhat hispid throughout, the foliage silvery; stems few to numerous, ascending, simple or few-branched. Lower leaves linear-lanceolate to ovate-lanceolate, 3–10 cm. long, 0.5–2.5 cm. broad (those of sterile shoots often much smaller), mostly entire, prominently veined, the petiole slender, about equaling the blade; cauline leaves entire, reduced upwards; flowers numerous in dense, paniculate or racemose cymes, the cymes 2–10 cm. long, erect in fruit; calyx-lobes linear-oblong to lanceolate, 3–6 mm. long, 0.5–1 mm. broad, canescent and hirsute or more or less hispid, up to 8 mm. long in fruit; corolla white to lavender, 4–6 mm. long, 5–6 mm. broad; stamens 6–10 mm. long, the filaments pubescent at the middle, the anthers 0.5–0.7 mm. long; style 7–11 mm. long, pubescent toward the base; capsule ovoid, 3 mm. long, acuminate, canescent; seeds 1 or 2, oblong-ovoid, 2–2.5 mm. long, brown.

Sandy or rocky soil in sagebrush or pine forest, Arid Transition and Upper Sonoran Zones; Montana to western Nebraska and Colorado, west to eastern British Columbia, and south through central and eastern Washington and Oregon to northeastern California. Type locality: "Goat Island, upper North fork of the Platte" (Natrona County, Wyoming). June–July.

Phacelia leucophylla var. *Suksdórfii* J. F. Macbride, Contr. Gray Herb. No. 49: 34. 1917. Herbage usually grayish green and strongly hispid; some leaves divided or toothed; calyx-lobes densely and harshly hispid. Along the Columbia River east of the Cascade Mountains, central Washington and Oregon. Type locality: near Bingen, Klickitat County, Washington.

Phacelia alpina Rydb. Mem. N.Y. Bot. Gard. 1: 324. 1900. Lower and often dwarfed; leaves greenish, sparsely strigose to somewhat sericeous; corolla usually lavender. Higher elevations, eastern Oregon to Montana, Nevada, and Utah. Type locality: Cedar Mountain, Montana.

Phacelia magellanica f. *compácta* Brand, Univ. Calif. Pub. Bot. 4: 217. 1912. Low, caespitose perennial, densely white-hispid; leaves linear-oblong to oval; corolla usually white. Eastern slopes of the Cascade and Sierra Nevada ranges, from central Oregon to Inyo County, California. Type locality: Douglas County, Nevada.

29. *Phacelia nemoralis* Greene. Shade Phacelia. Fig. 4088.

Phacelia nemoralis Greene, Pittonia 1: 141. 1887.

Phacelia Biolettii Greene, op. cit. 5: 23. 1902.

Biennial or weakly perennial, 5–15 dm. tall from a taproot, coarsely hispid throughout,

the foliage green or greenish; stem usually solitary, simple or branching only at the base, ascending or erect. Lower leaves ovate-lanceolate to ovate, 4-10 cm. long, 2-6 cm. broad, simple or pinnate with one or two pairs of small lateral leaflets at base, much smaller than the terminal, all acute, prominently veined, the petiole stout, densely hispid, usually longer than the blade; cauline leaves numerous, mostly ovate and entire; flowers numerous in dense corymbose or subcapitate, scattered cymes, the cymes 2-8 cm. long, spreading in fruit; calyx-lobes lanceolate to oblanceolate, 4-5 mm. long, 1-1.5 mm. broad, densely glistening brownish-hispid but green on the back, subequal, little enlarged in fruit; corolla greenish white, 3-5 mm. long, 3-4 mm. broad; stamens 7-9 mm. long, the filaments pubescent above the middle, the anthers about 0.5 mm. long; style 6-9 mm. long, pubescent below; capsule globose-ovoid, 2-3 mm. long, hispid; seeds 1-4, ovoid, 1.5-2 mm. long, dark brown.

Moist, usually coniferous woods, Humid Transition Zone; Vancouver Island through western Washington and Oregon to the Coast Ranges of central California (Santa Clara County). Type locality: "hills behind Oakland and Berkeley, Cal." April-July.

Phacelia leptosépala Rydb. Bull. Torrey Club 36: 676. 1909. Low, caespitose perennial; leaves narrowly lanceolate; calyx-lobes linear, densely glistening brownish-hirsute. Moist rocky slopes, Boreal Zones; British Columbia and the Cascade Range of Washington and northern Oregon; Olympic Mountains; east to Montana. Type locality: Vermilion Lake, British Columbia.

30. *Phacelia mutábilis* Greene. Changeable *Phacelia*. Fig. 4089.

Phacelia mutabilis Greene, Erythea 4: 55. 1896.

Phacelia magellanica f. *griseophylla* Brand, Univ. Calif. Pub. Bot. 4: 218. 1912.

Phacelia nemoralis var. *pseudo-hispida* Brand, op. cit. 210.

Phacelia californica var. *rubacea* Jepson, Man. Fl. Pl. Calif. 820. 1925.

Biennial or weakly perennial, 1-4.5 dm. tall from a slender taproot, appressed-hispid and hirsutulous throughout, the foliage green or grayish; stems usually several, slender, ascending, simple. Leaves thin, the lower weakly clustered, lanceolate to ovate, 1-8 cm. long, 1-3 cm. broad, pinnate and the terminal leaflet much larger than the lateral, or entire, obtuse or acute, not very conspicuously veined, the petiole slender, usually exceeding the blade; cauline leaves scattered, mostly entire; flowers numerous in short, paniculate or racemose cymes, the cymes 1-5 cm. long, ascending in fruit; calyx-lobes linear to narrowly oblanceolate, 3-4 mm. long, 0.5-1 mm. broad, hispid and hirsutulous, in fruit 6-10 mm. long, 0.5-1 mm. broad (or some broadly dilated at the tip), often purplish; corolla deep lavender to yellowish white, 4-6 mm. long, 4-5 mm. broad, often becoming entangled in the stamens and hence tardily deciduous; stamens 6-8 mm. long, the filaments pubescent, the anthers about 0.5 mm. long; style 6-8 mm. long, puberulent; capsule ovoid, 2-3 mm. long, hirsute, acute; seeds 1-4, oblong-ovoid, 1.5-2 mm. long, brown.

Pine woods, Transition and Boreal Zones; Cascade Mountains, from Mount Rainier to Mount Shasta, thence in the Coast Ranges to Glenn and Lake Counties, California; and in the Sierra Nevada to Kern County. Type locality: "towards Castle Peak." June-Aug.

31. *Phacelia frígida* Greene. Timberline *Phacelia*. Fig. 4090.

Phacelia frigida Greene, Pittonia 4: 39. 1899.

Phacelia dasyphylla Greene ex J. F. Macbride, Contr. Gray Herb. No. 49: 35. 1917.

Phacelia heterophylla var. *pygmaea* Jepson, Man. Fl. Pl. Calif. 819. 1925.

Cespitose perennial, 0.5-3 dm. tall from a branched caudex, coarsely hispid and hispidulous throughout, the foliage greenish gray to white, coarsely hispid, the inflorescence hispid; stems slender, several, decumbent or ascending. Lower leaves densely rosulate, mostly lanceolate, 1.5-4 cm. long, 0.5-1 cm. broad, usually all entire, acute, prominently veined, the petiole slender, usually longer than the blade; cauline leaves few, entire, reduced; flowers numerous in dense paniculate to subcapitate cymes, the cymes 1-4 cm. long, ascending in fruit; calyx-lobes linear, 3-5 mm. long, 0.5-1 mm. broad, conspicuously hispid-ciliate, in fruit 6-8 mm. long, 0.5-1 mm. broad, often purplish; corolla lavender to white, 4-6 mm. long and broad; stamens 6-8 mm. long, the filaments pubescent to glabrate, the anthers about 0.5 mm. long; style about 8 mm. long, pubescent below; capsule ovoid, about 3 mm. long, acute, hispid; seeds usually 1, lance-ovoid, about 2 mm. long, brown.

Talus slopes in the high mountains, mostly above 7,000 feet, Boreal Zones; southern Sierra Nevada north to Crater Lake, in the Cascade Mountains; White Mountains. Type locality: Mount Shasta. July-Sept.

32. *Phacelia corymbòsa* Jepson. Serpentine *Phacelia*. Fig. 4091.

Phacelia magellanica f. *ferruginea* Brand, Pflanzenreich 4201: 100. 1913.

Phacelia californica f. *immunda* J. F. Macbride, Contr. Gray Herb. No. 53: 18. 1918.

Phacelia dasyphylla var. *ophitidis* J. F. Macbride, op. cit. 59: 32. 1919.

Phacelia corymbosa Jepson, Man. Fl. Pl. Calif. 820. 1925.

Cespitose perennial, 1.5-4 dm. tall from a branched caudex, hispid and hispidulous throughout, the stems and inflorescence glandular-puberulent, the foliage green or greenish; stems several to numerous, erect or ascending, simple. Lower leaves densely rosulate, linear-lanceolate to oblong, 2-7 cm. long, 0.6-1 cm. broad, entire or the larger with one or two pairs of smaller leaflets at base, acute, prominently veined, the petiole slender, shorter to longer than the blade; cauline leaves few, entire, reduced; flowers numerous in dense or open, corymbose cymes, the cymes 2-8 cm. long, spreading in fruit; calyx-lobes narrowly lanceolate, 4-5 mm. long, 0.5-1 mm. broad, hispid, in fruit 6-10 mm. long, 1-2.5 mm. broad, sometimes unequal; corolla white, 5-7 mm. long and broad; stamens about 10 mm. long, the filaments pubescent to glabrate,



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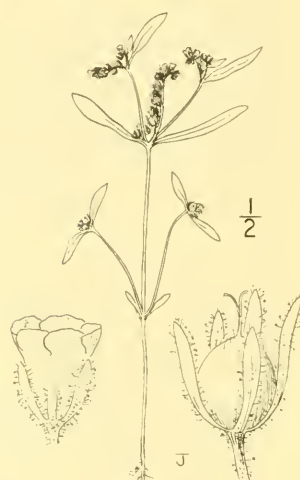
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4086. *Phacelia heterophylla*
 4087. *Phacelia leucophylla*
 4088. *Phacelia nemoralis*

4089. *Phacelia mutabilis*
 4090. *Phacelia frigida*
 4091. *Phacelia corymbosa*

4092. *Phacelia Dalesiana*
 4093. *Phacelia Pringlei*
 4094. *Phacelia racemosa*

the anthers about 0.5 mm. long; style 10–12 mm. long, pubescent below; capsule lance-ovoid, 4 mm. long, acuminate, hispid; seeds 1–2, oblong-ovoid, 2.5 mm. long, light brown.

Open, usually serpentinized slopes, usually below 7,000 feet, Transition and Boreal Zones; Klamath-Siskiyou region of southwestern Oregon and northern California. Type locality: Upper Sacramento River, Dunsuir, California. May–Aug.

33. *Phacelia Dalesiana* J. T. Howell. Trinity *Phacelia*. Fig. 4092.

Phacelia Dalesiana J. T. Howell, Leaflets West. Bot. 2: 51. 1937.

Perennial, 0.5–1.5 dm. tall from a stout root crown, finely pubescent and somewhat viscid; stems few, slender, decumbent. Basal leaves densely rosulate, oblong to oval, 1–5 cm. long, 0.5–3 cm. broad, entire, not strongly parallel-veined, the petiole slender, about as long as the blade; cauline leaves 1–3; flowers few, long-pedicellate in lax, scarcely scorpioid simple cymes, the cymes up to 6 cm. long, the pedicels 5–20 mm. long in fruit, spreading or curved; calyx-lobes oblanceolate, 3 mm. long, unequal, pubescent, in fruit up to 6 mm. long, subcoriaceous; corolla white with purple markings in the throat, subrotate, deciduous, 0.6–0.9 cm. long, 1–1.5 cm. broad, the lobes broadly oval, 3–5 mm. long; stamens included, 8 mm. long, the filaments glabrous; scales semiobicular, 2 mm. long, wholly adnate to the corolla-tube, free from the filaments; style included, 7 mm. long, divided nearly to the base, pubescent below; capsule subglobose, 4 mm. long, pubescent; seeds 2–4, ovoid, 2.5–3 mm. long, reticulate.

Mountain meadows, Boreal Zones; known only from the type locality: "summit of the Scott Mts. in Trinity County [California] north of Carrville." May–June.

34. *Phacelia Pringlei* A. Gray. Pringle's *Phacelia*. Fig. 4093.

Phacelia Pringlei A. Gray, Proc. Amer. Acad. 17: 223. 1882.

Annual, 0.5–1.5 dm. tall from a slender taproot, glandular-puberulent throughout; stems erect, usually branched. Basal leaves opposite and alternate, linear to oblanceolate, 1–3 cm. long, up to 0.5 cm. broad, entire, tapering into a slender petiole; cauline leaves numerous, like the basal but short-petiolate; flowers rather few, short-pedicellate in lax, almost filiform, simple or branched cymes, the cymes 2–8 cm. long, erect in fruit; calyx-lobes linear to oblanceolate, 1–2 mm. long, up to 0.3 mm. broad, usually unequal, hispidulous and glandular, 2–5 mm. long in fruit; corolla lavender, pelviform or subrotate, deciduous, 3–5 mm. long, 4–6 mm. broad, the lobes obovate, 1.5–2.5 mm. long, the whole longer than the calyx; stamens about equaling the corolla, 3–4 mm. long, the anthers ovoid, about 0.3 mm. long, the filaments papillate; scales oblong, 0.5 mm. long, adnate; style 3–4 mm. long, parted nearly to the base, pubescent; capsule subglobose, 2.5–3.5 mm. long, hispidulous; seeds 2–8, oblong-ovoid, 1.5–1.75 mm. long, brown, coarsely foveolate.

Moist soil in coniferous woods, Boreal Zones; Scott Mountains, Siskiyou and Trinity Counties, California. Type locality: "Mountains about the headwaters of the Sacramento River, N. California." May–Aug.

Phacelia Péckii J. T. Howell, Leaflets West Bot. 4: 25. 1944. Under this name are distinguished the plants of southern Oregon, which differ from the Californian representatives by their fewer and stricter branches, slightly larger violet corollas, longer filament-processes, more numerous ovules, and more finely marked seeds. Josephine and Jackson Counties, Oregon. Type locality: Grizzly Peak, Jackson County.

Phacelia Leônisi J. T. Howell, Leaflets West. Bot. 3: 206. 1943. Flowers rather crowded; calyx-lobes up to 7 mm. long in fruit; corolla lavender, broadly campanulate, 2–3 mm. long, the lobes 1–2 mm. long, crenulate; stamens included, up to 2 mm. long, the filaments glabrous to pubescent; scales minute or obsolete; style 2 mm. long, parted nearly to the base, glabrous; seeds ovoid, 3–6. Known only from the Klamath-Siskiyou region of northwestern California. Type locality: Takilma–Happy Camp Road, Siskiyou County, California.

35. *Phacelia racemosa* (Kell.) Brandg. Racemose *Phacelia*. Fig. 4094.

Nama racemosa Kell. Proc. Calif. Acad. 5: 51. 1873.

Phacelia namatoides A. Gray, Proc. Amer. Acad. 10: 317. 1875.

Phacelia racemosa Brandg. Zoe 2: 252. 1891.

Annual, 0.3–2 dm. tall from a slender taproot, strigulose and glandular above, glabrous or glabrate and glaucous below; stems erect, commonly branching diffusely from the elongate lower nodes. All but the uppermost leaves opposite, linear-lanceolate to lanceolate or oblong, 1–4 cm. long, 0.2–0.8 cm. broad, entire or repand, succulent, tapering into a short petiole; cauline leaves few, like the basal; flowers numerous, short-pedicellate in almost filiform, simple or branched cymes, the cymes 1–4 cm. long, erect in fruit; calyx-lobes linear to linear-oblanceolate, 1–2.5 mm. long, about 0.5 mm. broad, hirsutulous, usually unequal, up to 5 mm. long in fruit; corolla pale blue, tubular-campanulate, deciduous, 2–4 mm. long, 1.5–2 mm. broad, the lobes oval, about 1 mm. long, the whole a little longer than the calyx; stamens included, unequal, 1–2 mm. long, the filaments glabrous, the anthers oval, about 0.3 mm. long; scales unequal, narrow, wholly adnate or the tips free; style included, 1–1.5 mm. long, pubescent, divided two-thirds to three-fourths; capsule globose, 2–3 mm. long, hirsutulous; seeds usually 4, ovoid, 1.5–2 mm. long, dark brown, finely foveolate.

Gravelly soil in pine woods, Boreal Zones; Sierra Nevada, California, from Plumas County to Fresno County. Type locality: Cisco, Placer County. June–Aug.

36. *Phacelia Eisenii* Brandg. Eisen's *Phacelia*. Fig. 4095.

Phacelia Eisenii Brandg. Zoe 2: 252. 1891.

Phacelia minima J. F. Macbride, Contr. Gray Herb. No. 49: 38. 1917.

Phacelia Eisenii var. *Brandegeana* J. T. Howell, Amer. Midl. Nat. 30: 14. 1943.

Annual, 0.2–1.5 dm. tall from a slender taproot, softly hirsutulous throughout and sometimes a little glandular; stems ascending, usually branched. Basal leaves alternate or some

usually opposite, linear-oblong to oval, 0.5–2 cm. long, 0.2–1 cm. broad, entire or pinnately few-lobed, tapering into a slender petiole; cauline leaves alternate, like the basal; flowers few, slender-pedicellate in short, lax, almost filiform cymes, the cymes 1–4 cm. long, erect in fruit; calyx-lobes linear-oblancoale, 1.5–2.5 mm. long, up to 0.5 mm. broad, hirsutulous, a little unequal, in fruit 3–5 mm. long; corolla lavender to nearly white, broadly campanulate, deciduous, 2–4 mm. long, 3–5 mm. broad, the lobes oval to obovate, 1–2 mm. long, the whole longer than the calyx; stamens about equaling the corolla, 3–5 mm. long, the filaments glabrous, the anthers oval, about 0.3 mm. long; scales small and narrow, wholly adnate and united at base in front of the filaments; style included, 1–3.5 mm. long, glabrous to glandular-puberulent, parted nearly to the base; capsule subglobose, 2–3 mm. long, hirsutulous; seeds 2–4, oblong-ovoid, about 1.5 mm. long, brown, coarsely foveolate.

Coniferous woods, Boreal Zones; central and southern Sierra Nevada, California, from Eldorado County to Inyo and Tulare Counties. Type locality: "in Fresno County." June–July.

37. *Phacelia orògenes* Brand. Mountain Phacelia. Fig. 4096.

Phacelia orogenes Brand, Jahresb. Kgl. Gymnas. Sorau Beilage 7. 1911.

Annual, 2–10 cm. tall from a slender taproot, softly hirsutulous and a little glandular throughout; stem simple, filiform, erect; cotyledons persistent, oval or ovate. Basal leaves opposite, linear-lanceolate, 1–3 cm. long, 1–3 mm. broad, entire, tapering into a slender petiole longer than the blade; flowers few in a lax terminal cyme, the cymes up to 4 cm. long, the pedicels slender; calyx-lobes linear, 2–3 mm. long, unequal, glandular and hirsutulous, up to 8 mm. long, 5 mm. broad in fruit; corolla pelviform, deciduous, the lobes violet, the tube white, 4–6 mm. long, 5–7 mm. broad, the lobes 3–4 mm. long, the whole a little longer than the calyx; stamens slightly exerted, 3–5 mm. long, the anthers 0.5 mm. long, the filaments glabrous; scales oblong, almost free from the filaments; style a little exerted, 3.5 mm. long, parted nearly to the base, hairy; capsule subglobose, 3 mm. long, hairy; seeds 3–6, ovoid-angled, 1.5–2 mm. long, foveolate.

Moist places, Boreal Zones; southern Sierra Nevada, California. Type locality: Eagle Lake Trail near Mineral King, Tulare County. July–Aug.

38. *Phacelia Brèweri* A. Gray. Brewer's Phacelia. Fig. 4097.

Phacelia Breweri A. Gray, Proc. Amer. Acad. 10: 317. 1875.

Annual, 0.8–2 dm. tall from a slender taproot, puberulent and hirsute throughout; branches prostrate or ascending, usually branched. Basal leaves alternate, lanceolate to ovate, 1–4 cm. long, 0.5–2 cm. broad, pinnately lobed or pinnatifid (rarely entire), tapering into a slender petiole, the parallel lateral veins conspicuous; cauline leaves numerous to few, like the basal, or entire and short-petiolate; flowers short-pedicellate, numerous, in simple or few-branched cymes, the cymes 4–8 (or 12) cm. long, erect or ascending in fruit; calyx-lobes linear-oblong, obtuse, 2–3 mm. long, 0.3 mm. broad, slightly accrescent, densely hispid; corolla pale blue or lavender to white, pelviform, deciduous, 4–6 mm. long and broad, the lobes obovate, 1–3 mm. long, the whole longer than the calyx; scales narrow and short, acute, adnate by one edge; stamens included, 3–4.5 mm. long, the filaments glabrous; style included, 2–3 mm. long, parted to below the middle, pubescent; capsule ovoid, 2–3 mm. long, acuminate, flattened, hispid; seeds 1 or 2, lanceolate-ovoid, light brown, shining, about 2 mm. long, finely foveolate.

Rocky slopes, often in light shade, Upper Sonoran Zone; South Coast Ranges of California, from Mount Diablo to San Benito and Fresno Counties. Type locality: Mount Diablo. April–May.

39. *Phacelia hùmilis* Torr. & Gray. Low Phacelia. Fig. 4098.

Phacelia humilis Torr. & Gray, Pacif. R. Rep. 1: 122. pl. 7. 1855.

Phacelia irritans Brand, Jahresb. Kgl. Gymnas. Sorau Beilage 7. 1911.

Phacelia violacea Brand, Rep. Spec. Nov. 17: 319. 1921.

Phacelia humilis var. *Dudleyi* J. T. Howell, Amer. Midl. Nat. 30: 9. 1943.

Annual, 0.5–2 dm. tall from a slender taproot, softly hirsute throughout; stems erect, simple or diffusely branched. Basal leaves alternate or the lowest opposite, oblong-lanceolate to ovate, 1–4.5 cm. long, 0.5–1.5 cm. broad, entire, venose, tapering into a petiole of about equal length; cauline leaves numerous, like the basal but short-petiolate; flowers numerous, short-pedicellate in dense, simple or few-branched cymes, the cymes 2–5 cm. long, erect in fruit; calyx-lobes linear to narrowly oblanceolate, 3–5 mm. long, 0.5 mm. broad, densely white-hirsute, a little accrescent in fruit; corolla violet, pelviform, deciduous, 4–6 mm. long and broad, the lobes obovate, 2–3 mm. long, the whole much longer than the calyx; stamens exerted, 4–8 mm. long, the filaments pubescent, the anthers oval, about 0.5 mm. long; scales triangular-ovate, adnate by one edge; style exerted, 4–8 mm. long, glabrous or sparsely pubescent, parted to below the middle; capsule ovoid, 2–5 mm. long, acute, hirsute; seeds 1–4, oblong-lanceolate, 2–2.5 mm. long, brown, finely foveolate.

Moist shaded sand, Boreal Zones; Wenatchee region of central Washington to northeastern and eastern California, east to Nevada; Tehachapi Mountains. Type locality: near the summit of the Sierra Nevada, California. June–July.

40. *Phacelia marcéscens* Eastw. Persistent-flowered Phacelia. Fig. 4099.

Phacelia marcescens Eastw. ex J. F. Macbride, Contr. Gray Herb. No. 49: 39. 1917.

Annual, 0.5–2 dm. tall from a slender taproot, short-hirsute and glandular throughout; stems erect, simple or diffusely branched. Basal leaves alternate or the lowermost opposite,

ovate-lanceolate to ovate, 1–4 cm. long, 0.3–2 cm. broad, entire or occasionally toothed or lobed, tapering into a slender petiole; cauline leaves numerous, like the basal but short-petiolate to subsessile; flowers numerous, short-pedicellate in dense, simple or few-branched cymes, the cymes 1.5–4 cm. long, erect and elongate in fruit; calyx-lobes linear to oblanceolate, about 2 mm. long, 0.5 mm. broad, subequal, short-hirsute and viscid, 3–4 mm. long, 0.5–1.5 mm. broad in fruit; corolla violet, broadly campanulate, marcescent, 4 mm. long, 3–5 mm. broad, the lobes oval, 2 mm. long, crenulate, the whole a little longer than the calyx; stamens usually a little exserted, 5–6 mm. long, the filaments glabrous; scales very narrow, attached by one edge; style usually a little exserted, 5–6 mm. long, glandular-hirsute below, parted two-thirds; capsule ovoid, 3 mm. long, hirsute, or strigulose; seeds usually 2, narrowly ovoid, about 1.5 mm. long, brown, coarsely foveolate.

Pine forests, Boreal Zones; western slope of the Sierra Nevada, California, in Nevada and Placer Counties. Type locality: Bear Valley, Nevada County, California. May–July.

Phacelia Quickii J. T. Howell, Leaflets West. Bot. 3: 140. 1942. (*Phacelia Dociana* Jepson & Hoover ex Jepson, Fl. Calif. 3: 254. 1943.) Basal leaves linear to lanceolate; calyx-lobes unequal; corolla pale blue or lavender, tardily deciduous; capsule 2.5 mm. long; seeds broadly ovoid. Western slope of the Sierra Nevada from Eldorado County to Tulare County, California. Type locality: "3 miles northeast of Strawberry, Tuolumne County, California."

Phacelia Grœnei J. T. Howell, Amer. Midl. Nat. 30: 17. 1943. Calyx-lobes subequal; corolla violet, rotate, deciduous, 5–6 mm. long, 7–9 mm. broad; stamens exserted, about 5 mm. long, the filaments papillate; scales narrowly oblong; style 6–6.5 mm. long, parted about two-thirds, hirsutulous; seeds oblong, 3 or 4, 1.5–2 mm. long. Known only from Scott Mountain and the type collection: Yreka, Siskiyou County, California.

41. *Phacelia mohavensis* A. Gray. Mojave *Phacelia*. Fig. 4100.

Phacelia mohavensis A. Gray, Syn. Fl. N. Amer. 2: 164. 1878.

Phacelia mohavensis var. *exilis* A. Gray, op. cit. 165.

Annual, 0.5–3 dm. tall from a slender taproot, hirsute and somewhat glandular throughout; stems erect, simple or diffusely branched. Basal leaves alternate, or some usually opposite, linear to oblanceolate, 1–3 cm. long, 0.5–1.5 cm. broad, entire, toothed or lobed, tapering into a slender petiole; cauline leaves numerous, like the basal but short-petiolate; flowers numerous, short-pedicellate in dense, simple or few-branched cymes, the cymes up to 2 dm. long, erect in fruit; calyx-lobes linear to narrowly oblanceolate, 3–5 mm. long, 0.5–1.5 mm. broad, unequal, glandular-hirsutulous, 5–15 mm. long, 0.5–2 mm. broad in fruit; corolla lavender, pelviform, deciduous, 5–8 mm. long and broad, the lobes obovate, 1.5–3.5 mm. long, the whole much longer than the calyx; stamens usually a little exserted, 5–8 mm. long, the anthers oval, about 0.5 mm. long, the filaments papillate; scales lanceolate, the edges of adjacent pairs connivent; style usually a little exserted, 5–8 mm. long, parted to below the middle, hairy; capsule ovoid, 3–5 mm. long, acute, hirsute and glandular; seeds 4–8, ovoid, 1.5 mm. long, dark brown, coarsely foveolate.

Pine forests, Boreal Zones; southern Sierra Nevada and the San Gabriel and San Bernardino Mountains. Type locality: southeastern California on the Mojave River. April–July.

Phacelia austromontana J. T. Howell, Leaflets West. Bot. 3: 190. 1942. (*Phacelia humilis* var. *lobata* Davidson, Bull. S. Calif. Acad. 5: 61. 1906; *P. lobata* Jepson, Fl. Calif. 3: 253. 1943.) Calyx-lobes unequal, in fruit up to 5 mm. long; stamens about equaling the corolla, 2–4 mm. long; style 3–4 mm. long; seeds 2–4. Southern Sierra Nevada and ranges bordering the Mojave Desert, east to Utah. Type locality: South Fork of Rock Creek, San Gabriel Mountains, Los Angeles County, California.

42. *Phacelia minutissima* Henderson. Least *Phacelia*. Fig. 4101.

Phacelia minutissima Henderson, Bull. Torrey Club 27: 351. 1900.

Phacelia foliosepala Nels. & Macbr. Bot. Gaz. 55: 377. 1913.

Annual, 0.2–1.2 dm. tall from a slender taproot, glandular-hirsutulous throughout; the stems erect, simple or branched. Basal leaves opposite, the others alternate, narrowly oblanceolate to ovate-lanceolate, 1–3 cm. long, 3–5 mm. broad, entire to denticulate, tapering into a short petiole; cauline leaves few, like the basal; flowers few, pedicellate in simple, lax cymes, the cymes 1–4 cm. long, erect in fruit; calyx-lobes foliaceous, linear-oblanceolate to spatulate, 2–4 mm. long, 0.5–1 mm. broad, often unequal, glandular-hirsutulous, 6–15 mm. long, 3 mm. broad in fruit; corolla lavender, tubular-campanulate, deciduous, 3–4 mm. long, 2–3 mm. broad, the lobes oval, about 1 mm. long, the whole usually shorter than the calyx; stamens included, 1.5 mm. long, the anthers 0.3 mm. long, the filaments glabrous; scales linear, inconspicuous; style included, about 1 mm. long, parted about to the middle; capsule oblong-ovoid, 4–5 mm. long, acute, hirsute; seeds 8–12, ovoid, 1–1.5 mm. long, brown, minutely foveolate.

Gravelly soil, Boreal Zones; Wallowa Mountains of northeastern Oregon to Idaho and Nevada. Type locality: Soldier Mountain, Blaine County, Idaho. June–July.

43. *Phacelia linearis* (Pursh) Holz. Linear-leaf *Phacelia*. Fig. 4102.

Hydrophyllum lineare Pursh, Fl. Amer. Sept. 1: 134. 1814.

Eutoca Menziesii R. Br. in Richards, in Frankl. 1st Journ. Bot. App. 764, pl. 27. 1823.

Eutoca multiflora Dougl. ex Lindl. Bot. Reg. 14: pl. 1180. 1828.

Eutoca congesta Dougl. ex Lehm. Stirp. Pug. 2: 18. 1830.

Eutoca heterophylla Torr. ex Stansbury's Exp. 393. 1853.

Phacelia Menziesii Torr. ex S. Wats. Bot. King Expl. 252. 1871.

Phacelia linearis Holz. Contr. U.S. Nat. Herb. 3: 242. 1895.

Annual, 1–5 dm. tall from a slender taproot, strigulose and sparsely hirsute throughout, nonglandular; stems usually erect and simple, or branched and spreading. First basal leaves opposite, the others alternate, linear to lanceolate, 2–8 cm. long, 0.5–3 cm. broad, sessile or



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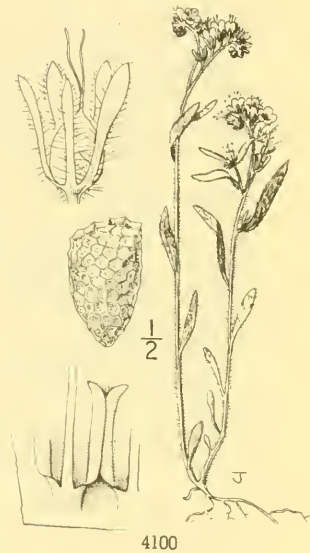
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4095. *Phacelia Eisenii*
 4096. *Phacelia orogenes*
 4097. *Phacelia Brewerii*

4098. *Phacelia humilis*
 4099. *Phacelia marcescens*
 4100. *Phacelia mohavensis*

4101. *Phacelia minutissima*
 4102. *Phacelia linearis*
 4103. *Phacelia vallicola*

nearly so, entire or pinnately lobed with 2-6 linear lobes toward the base; cauline leaves alternate, numerous, like the basal; flowers numerous, short-pedicellate in open, leafy, thyrsoid-paniculate cymes, 1-3 dm. long, the cymes erect in fruit; calyx-lobes linear to oblanceolate, 4-6 mm. long, 1 mm. or less broad, strongly hirsute on the margins, slightly accrescent in fruit; corolla bluish purple to white, pelviform, deciduous, 6-10 mm. long, 10-15 mm. broad, the lobes obovate, 4-5 mm. long, the whole much longer than the calyx; stamens about equaling the corolla, 5-6 mm. long, the anthers oblong, 1 mm. long, the filaments sparsely hairy and minutely glandular; scales linear-oblong with free tips, free from the stamens; style 5-8 mm. long, cleft about one-third, hirsutulous; capsule ovoid-lanceolate, 5-7 mm. long, acuminate, sparsely hirsute; seeds usually 6-15, oblong-ovoid, about 1.5 mm. long, dark brown or black, foveolate.

Sandy or rocky soil, Upper Sonoran and Transition Zones; northern California and southwestern Oregon, eastward throughout the Great Basin and to the Rocky Mountains from British Columbia and Alberta to Wyoming. Type locality: "On the banks of the Missouri" (probably at The Dalles, Oregon). May-June.

44. *Phacelia vallicola* Congdon. Mariposa *Phacelia*. Fig. 4103.

Phacelia vallicola Congdon ex Brand, Jahresb. Kgl. Gymnas. Sorau Beilage 7. 1911.

Phacelia curvipes var. *yosemitana* Brand, Univ. Calif. Pub. Bot. 4: 222. 1912.

Annual, 1-3 dm. tall from a slender taproot, hirsute and hirsutulous throughout, slightly glandular; stems erect, simple and virgate or branched. Basal leaves opposite, the others alternate, ovate-lanceolate to ovate, 1-3.5 cm. long, 0.5-1 cm. broad, entire, venose, tapering into a usually short petiole; cauline leaves few, like the basal; flowers numerous, short-pedicellate in simple or few-branched cymes, the cymes 5-7 cm. long, erect in fruit; calyx-lobes linear-spatulate to obovate, 3-5 mm. long, 0.5-1 mm. broad, usually unequal, hirsute and sparsely glandular, up to 10 mm. long and 3 mm. broad in fruit; corolla purple, tubular-campanulate, deciduous, 4-6 mm. long and broad, the lobes obovate, 1.5-2 mm. long, the whole longer than the calyx; stamens included, 2-3 mm. long, the anthers 0.5 mm. long, the filaments papillate; scales oblong, attached to the filaments at base; style included, about 2.5 mm. long, parted to below the middle, hairy; capsule ovoid, 4-6 mm. long, acute, hirsute; seeds about 10, oblong-ovoid, angled, 1.5-2 mm. long, brown, irregularly foveolate.

Foothills, Arid Transition Zone; central Sierra Nevada, California. Type locality: Hites Cove, Mariposa County, California. April-May.

45. *Phacelia verna* Howell. Umpqua *Phacelia*. Fig. 4104.

Phacelia verna Howell, Erythra 3: 35. 1895.

Phacelia Howellii J. F. Macbride, Contr. Gray Herb. No. 49: 41. 1917.

Annual, 0.5-2.5 dm. tall from a slender taproot, hirsute and somewhat glandular throughout; stems simple or branching at base, erect. Basal leaves ovate to obovate, 1.5-3 cm. long, 0.5-1 cm. broad, venose, entire or some of the lower toothed, abruptly narrowed into a short winged petiole; flowers rather numerous, short-pedicellate in dense terminal and axillary cymes, the cymes 2-5 cm. long, becoming loose in fruit; calyx-lobes linear-spatulate, 3-4 mm. long, 1 mm. or less broad, unequal, hirsutulous, 5-7 mm. long and up to 1.5 mm. broad in fruit; corolla white or pale blue, deciduous, campanulate, 5-7 mm. long, the lobes 2.5-3.5 mm. long; stamens slightly exerted, 6 mm. long, the anthers oval, 0.5 mm. long, the filaments glabrous; scales small, ovate, free from the filaments above; style about 5 mm. long, parted nearly to the base, hairy; capsule ovoid, 3-5 mm. long, acuminate, hirsutulous; seeds 6-10, 1-1.5 mm. long, oblong-ovoid, foveolate.

Crevices in basaltic bluffs, Humid Transition Zone; Umpqua River Valley, western Oregon. Type locality: Umpqua Valley, Oregon. April-June.

46. *Phacelia phacelioides* (Benth.) Brand. Mount Diablo *Phacelia*. Fig. 4105.

Eutoca phacelioides Benth. Trans. Linn. Soc. 17: 279. 1835.

Phacelia circinatiformis A. Gray, Proc. Amer. Acad. 10: 325. 1875.

Phacelia phacelioides Brand, Pflanzenreich 4²⁵¹: 117. 1913.

Annual, 0.5-2 dm. tall from a slender taproot, hirsute and puberulent throughout; stems erect or ascending, simple or branched. Basal leaves opposite or alternate, lanceolate or oblong to oval, 2-5 cm. long, 0.5-2 cm. broad, entire, tapering at base into a slender petiole, the parallel lateral veins conspicuous; cauline leaves numerous, like the basal but short-petiolate; flowers rather numerous, short-pedicellate in simple or branched cymes, the cymes 2-8 cm. long, erect or ascending in fruit; calyx-lobes linear-spatulate, acute, 4-5 mm. long, 1-1.5 mm. broad, densely hirsute, 10-12 mm. long, 2-3 mm. broad in fruit; corolla pale lavender to white, tubular-funnelform, deciduous, 4-7 mm. long, 3-4 mm. broad, the lobes oval, 1-2 mm. long, the whole about equaling the calyx; stamens included, 2-2.5 mm. long, the anthers about 0.5 mm. long, the filaments hairy; scales ovate, denticulate, united to the filaments at base; style 2 mm. long, included, cleft about to the middle, hirsutulous; capsule ovoid, 4 mm. long, acute, flattened, hirsute; seeds ovoid, 6-15, 1.5 mm. long, dark brown, roughly and irregularly foveolate.

Moist, rocky soil in shade of chaparral, Transition Zone; Inner South Coast Ranges, from Mount Diablo to Mount Hamilton. Type locality: "California." Collected by Douglas. April-May.

47. *Phacelia cúrvipes* Torr. Washoe *Phacelia*. Fig. 4106.

Phacelia cúrvipes Torr. ex S. Wats. Bot. King Expl. 252. 1871.

Phacelia pratensis Heller, Muhlenbergia 2: 236. 1906.

Annual, 0.3–1.5 dm. tall from a slender taproot, sparsely appressed-hirsute throughout, the inflorescence sparingly glandular; stems diffuse or ascending, branching at base and sometimes above. Basal leaves, at least the lowest, opposite, the upper alternate, oblong, 1–5 cm. long, 0.5–1 cm. broad, tapering into a petiole about equaling the blade, entire or occasionally few-toothed; cauline leaves alternate, rather few, like the basal; flowers few, short-pedicellate in rather lax, simple cymes 1–6 cm. long, these erect in fruit and the pedicels elongate, curved, spreading, or deflexed; calyx-lobes linear to oblanceolate, 3–6 mm. long, 0.5–1 mm. broad, in fruit 7–10 mm. long, 1.5–2 mm. broad, hirsute especially toward the base; corolla purplish blue to white, broadly campanulate, deciduous, 4–10 mm. long, 4–12 mm. broad, the lobes obovate, 1.5–4 mm. long, the whole equaling to twice as long as the calyx; stamens included, 2–6 mm. long, the anthers oblong-oval, about 0.5 mm. long, the filaments sparsely hairy; scales narrowly oblong, 1–1.5 mm. long, adnate, attached to the filaments only at base; style 1.5–7 mm. long, cleft to the middle, pubescent; capsule ovoid, flattened, 4–5 mm. long, acuminate, appressed-hirsute; seeds 6–16, oblong, about 1 mm. long, dark brown, irregularly foveolate.

Dry slopes in the mountains, Transition and Boreal Zones; desert ranges and eastern slope of the Sierra Nevada, to Nevada and Utah. Type locality: foothills near Carson City and Washoe and on the Trinity Mountains, western Nevada. April–June.

Phacelia Davidsonii A. Gray, Proc. Amer. Acad. 10: 324. 1875. (*Phacelia Davidsonii* var. *macrantha* Parish, Erythra 6: 90. 1898; *P. Aldersonii* Greene, Pittonia 5: 22. 1902; *P. nemophiloides* Greene, op. cit. 23.) Commonly larger throughout; leaves usually toothed, pinnately lobed, or pinnatifid; corolla pelviform, up to 15 mm. long, 20 mm. broad, often violet-maculate. Fine belt, southern Sierra Nevada and Tehachapi ranges to the mountains of southern California. Type locality: Kern County, California.

48. *Phacelia Douglasii* (Benth.) Torr. Douglas' *Phacelia*. Fig. 4107.

Eutoca Douglasii Benth. Trans. Linn. Soc. 17: 276. 1835.

Phacelia Douglasii Torr. Bot. Mex. Bound. 143. 1859.

Phacelia Douglasii var. *petrophila* Jepson, Man. Fl. Pl. Calif. 826. 1925.

Annual, 0.5–5 dm. tall from a slender taproot, softly hirsutulous throughout to somewhat hispid, the inflorescence glandular; branches prostrate or ascending, simple or branched. Basal leaves rosulate, oblong, 2–5 cm. long, 1–2 cm. broad, usually pinnatifid with numerous opposite, unequal, oblong or ovoid divisions, occasionally entire, few-toothed, or bipinnatifid, tapering into a slender petiole about equaling the blade; cauline leaves like the basal; flowers long-pedicellate in loose, few-flowered, simple cymes, the cymes 5–20 cm. long, erect or spreading in fruit, the pedicels elongate and recurved; calyx-lobes oblanceolate to narrowly spatulate, usually obtuse, 4–7 mm. long, 1.5–2 mm. broad, hirsute, slightly to strongly accrescent in fruit; corolla blue to purple, pelviform to subrotate, deciduous, 6–15 mm. long, 8–20 mm. broad, the lobes obovate, 3–6 mm. long, the whole much longer than the calyx; stamens included, 3–7 mm. long, the anthers oblong-ovoid, 0.5–0.8 mm. long, the filaments hairy or glabrous; scales ovate or lanceolate, 1.5–2 mm. long, wholly adnate; style included, 2–7 mm. long, cleft to the middle; capsule ovoid, 5–7 mm. long, acuminate, somewhat hirsute, flattened; seeds usually 10–20, ovoid, 0.5–1 mm. long, brown, foveolate.

Sandy moist flats, Transition and Sonoran Zones; California coast and Coast Ranges from the San Francisco Bay region to cismontane southern California; Sacramento Valley; San Joaquin Valley and bordering foothills. Type locality: California. Collected by Douglas. March–May.

Phacelia stellaris Brand, Pflanzenreich 4²⁵¹: 123. 1913. (*Phacelia Palmeri* Vasey & Rose, Proc. U.S. Nat. Mus. 11: 532. 1888. Not S. Wats. 1871; *P. Douglasii* var. *cryptantha* Brand, Pflanzenreich 4²⁵¹: 114. 1913.) Smaller in all parts; flowers 4–5 mm. long, 5–7 mm. broad, scarcely exceeding the calyx; pedicels 1–6 mm. long; style 1–2 mm. long. Cismontane southern California to Lower California. Type locality: San Quintin Bay, Lower California.

49. *Phacelia divaricàta* (Benth.) A. Gray. Divaricate *Phacelia*. Fig. 4108.

Eutoca divaricata Benth. Trans. Linn. Soc. 17: 278. 1835.

Eutoca Wrangeliana Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 37. 1836.

Phacelia divaricata A. Gray, Proc. Amer. Acad. 10: 325. 1875.

Annual, 0.5–3 dm. tall from a slender taproot, sparsely hirsute and pubescent throughout; stems erect or ascending, branching at base. Basal leaves alternate, oblong to ovate, 1–8 cm. long, 0.5–4 cm. broad, tapering into a petiole of equal or greater length, entire or occasionally with a few teeth at the base; flowers numerous, subsessile in short, pedunculate, simple or geminate, compact cymes, the cymes 2–15 cm. long, erect in fruit; calyx-lobes lanceolate to obovate, often unequal, 5–7 mm. long, 1–2 mm. broad, hirsute-ciliate, 8–14 mm. long, 2–4 mm. broad in fruit; corolla purplish blue, pelviform, deciduous, 10–18 mm. long, 15–24 mm. broad, the lobes obovate, 4–5 mm. long, the whole much longer than the calyx; stamens included, 8–10 mm. long, the anthers oblong-oval, 0.5–0.8 mm. long, the filaments glandular and sometimes hairy; scales ovate, adnate; style included, 6–10 mm. long, cleft to above the middle, hirsute; capsule ovoid, flattened, 6–10 mm. long, hirsute at the apex; seeds 8–15, ovoid, 1.5 mm. long, dark brown, foveolate.

Grassy open slopes, Transition Zone; Coast Ranges, Mendocino and Napa Counties to Santa Clara and San Benito Counties, California. Type locality: "California." Collected by Douglas. March–May.

Phacelia insularis Munz, Bull. S. Calif. Acad. 31: 113. 1932. (*Phacelia insularis* var. *continentis* J. T. Howell, Amer. Midl. Nat. 33: 474. 1945.) Stems prostrate or ascending; basal leaves lanceolate to oval, entire to pinnately lobed; flowers few, short-pedicellate in lax, open cymes, the lower pedicels elongate, the cymes spread-

ing in fruit; calyx-lobes oblong to spatulate, hirsutulous; corolla violet, the tube whitish, broadly campanulate, 5–10 mm. long and broad; stamens 3–5 mm. long, the filaments glandular-puberulent; scales usually free; style 3–5 mm. long, cleft above the middle; capsule obovoid. Coastal bluffs and dunes, Transition Zone; Mendocino and Marin Counties and San Miguel and Santa Rosa Islands, California. Type locality: "sand dunes at north-eastern part of Santa Rosa I."

50. *Phacelia Congdonii* Greene. Congdon's *Phacelia*. Fig. 4109.

Phacelia Congdonii Greene, *Pittonia* 5: 22. 1902.

Annual, 0.5–4 dm. tall from a slender taproot, soft-hirsute throughout, the pubescence of the leaves appressed; stems diffuse or ascending, branching at the base and sometimes above. Basal leaves alternate, oblong to oval, 1.5–4 cm. long, 0.5–2 cm. broad, tapering at the base into a slender petiole, entire or rarely with a few teeth; cauline leaves rather few, like the basal but short-petiolate; flowers subsessile, few in simple or sparsely branched cymes, the cymes 1–8 cm. long, erect in fruit; calyx-lobes linear to oblanceolate, 3–6 mm. long, 0.5–1.5 mm. broad, up to 10 mm. long, 2 mm. broad in fruit, or not enlarged, densely hirsute-ciliate with long white hairs; corolla purple, broadly campanulate, deciduous, 6–9 mm. long, 7–9 mm. broad, the lobes obovate, 2–5 mm. long, the whole much longer than the calyx; stamens included, 3–5 mm. long, the anthers oval, 0.5 mm. long, the filaments glabrous or puberulent; scales ovate, partly adnate; style included, 4–5 mm. long, parted to above the middle, hairy; capsule ovoid, 4–6 mm. long, acuminate, flattened, hirsute; seeds about 6, oblong-ovoid, 1.5 mm. long, brown, foveolate.

Chaparral and open woods, Transition Zone; Sierra Nevada foothills, Mariposa County to Kern County, and Tehachapi Mountains, California. Type locality: Buckeye, Mariposa County. April–May.

51. *Phacelia grisea* A. Gray. Santa Lucia *Phacelia*. Fig. 4110.

Phacelia grisea A. Gray, *Proc. Amer. Acad.* 12: 80. 1877.

Annual, 1.5–3.5 dm. tall from a slender taproot, hirsute and glandular-hirsutulous throughout; stems erect, branching. Basal leaves oblong to ovate, 1–3 cm. long, 1–2 cm. broad, entire or the larger toothed or lobed, the petiole shorter than the blade; flowers numerous, subsessile in dense, terminal cymes, the cymes in fruit 1–2 dm. long; calyx-lobes narrowly spatulate to obovate, unequal, 3–4 mm. long, 0.5–2 mm. broad, glandular-hirsute, 6–8 mm. long, 1–3 mm. broad in fruit; corolla white or pale lavender, pelviform, deciduous, about 5–6 mm. long and broad, the lobes 2–2.5 mm. long; stamens long-exserted, 7–8 mm. long, the anthers about 0.5 mm. long, the filaments papillate; scales oblong, adnate, attached to the filaments at base; style long-exserted, 5–9 mm. long, cleft about to the middle, hairy; capsule ovoid, acute, 4–5 mm. long, glandular-hispid; seeds 5–10, ovoid, 1.5 mm. long, brown, foveolate.

Moist slopes, Humid Transition Zone; Santa Lucia Mountains, Monterey and San Luis Obispo Counties, California. Type locality: Pine Mountain, back of San Simeon Bay, California. May–July.

52. *Phacelia Purpusii* Brandg. Purpus' *Phacelia*. Fig. 4111.

Phacelia humilis var. *calycosa* A. Gray, *Proc. Amer. Acad.* 10: 318. 1875.

Phacelia Purpusii Brandg. *Bot. Gaz.* 27: 451. 1899.

Annual, 1–4 dm. tall from a slender taproot, glandular-puberulent and somewhat hirsutulous throughout; stems erect, simple or few-branched and the branches spreading. Basal leaves opposite or alternate, oblong to ovate, 2–5 cm. long, 0.5–3 cm. broad, tapering into a petiole usually shorter than the blade, entire to pinnately divided; cauline leaves rather few, like the basal but short-petiolate or subsessile; flowers numerous, subsessile in simple or few-branched dense cymes, the cymes up to 1.5 dm. long, erect in fruit; calyx-lobes narrowly oblanceolate to broadly spatulate, 3–4 mm. long, 0.5–2 mm. broad, unequal, glandular-hirsutulous, 4–6 mm. long, 1–3 mm. broad in fruit; corolla lavender, pelviform, deciduous, 6–8 mm. long, 7–9 mm. broad, the lobes oval, 3–4 mm. long, the whole much longer than the calyx; stamens prominently exserted, 7–8 mm. long, the anthers oblong-oval, about 0.5 mm. long, the filaments papillate; scales oblong, the free margins of adjacent pairs connivent; style exserted, 6–9 mm. long, parted to below the middle, sparsely hairy; capsule ovoid, 4–5 mm. long, acute, glandular-hirsutulous; seeds 3–6, oblong-ovoid, 1.5–2 mm. long, dark brown, foveolate, the pits in more or less vertical rows.

Dry mountain slopes, Transition and Boreal Zones; Modoc County, California, through the Sierra Nevada to Kern County. Type locality: Sequoia Mills, Fresno County, California. May–July.

53. *Phacelia perityloides* Coville. Panamint *Phacelia*. Fig. 4112.

Phacelia perityloides Coville, *Proc. Biol. Soc. Wash.* 7: 75. 1892.

Perennial, 1–4 dm. tall from a suffrutescent caudex, the older parts white-tomentose, the younger glandular-pubescent; stems diffusely branched, often ascending. Basal leaves alternate, ovate to orbicular, 1–2.5 cm. long and broad, coarsely dentate to shallowly lobed, truncate or cordate at base, the slender petiole longer than the blade; cauline leaves numerous, like the basal; flowers few, long-pedicellate in lax cymes, the cymes 2–4 cm. long, erect in fruit; calyx-lobes oblong-spatulate, 5–6 mm. long, 1–2 mm. broad, glandular-pubescent, scarcely enlarged in fruit; corolla white, the tube yellowish to purplish, campanulate-funnelform, deciduous, 10–12 mm. long, 7–10 mm. broad, the lobes obovate, 2.5–3.5 mm. long, the whole much longer than the calyx; stamens included, 3–6 mm. long, unequal, the filaments glabrous, the anthers oblong, 0.5–0.75 mm. long; scales narrowly linear; style included, 4–5 mm. long, hairy below, barely bifid at apex; capsule oblong-ovoid, about 3–4 mm. long, pubescent; seeds 100–200, oblong-angled, about 0.5 mm. long, brown, shallowly foveolate.



4104



4105



4106



4107



4108



4109



4110



4111



4112

4104. *Phacelia verna*4105. *Phacelia phacelioides*4106. *Phacelia curvipes*4107. *Phacelia Douglasii*4108. *Phacelia divaricata*4109. *Phacelia Congdonii*4110. *Phacelia grisea*4111. *Phacelia Purpusii*4112. *Phacelia perityloides*

Rock crevices, Sonoran Zones; Panamint and neighboring ranges of the Death Valley region, eastern California. Type locality: Johnson Canyon, Panamint Mountains. March-June.

Phacelia geraniifolia Brand, Jahresb. Kgl. Gymnas. Sorau Beilage 7. 1911. (*Phacelia perityloides* var. *Jaegeri* Munz, Man. S. Calif. 412, 600. 1935.) Densely caespitose with rosulate sterile shoots at the base; older portions less hairy; leaves usually palmately lobed; pedicels reflexed in fruit; corolla 12-15 mm. long; seeds about 50. Clark Mountain, San Bernardino County, California, to adjacent Nevada. Type locality: Sheep Mountains, Nevada.

54. *Phacelia suaveolens* Greene. Sweet-scented *Phacelia*. Fig. 4113.

Phacelia suaveolens Greene, Pittonia 1: 223. 1888.

Annual, 0.5-4 dm. tall from a slender taproot, glandular-hirsutulous throughout; stems erect or spreading, simple or branched. Basal leaves oblong to ovate, 2-3 cm. long, 1-3 cm. broad, serrate to shallowly lobed, venose, tapering at base into a slender petiole; cauline leaves numerous, like the basal but short-petiolate; flowers numerous, short-pedicellate in dense, simple cymes, the cymes 2-7 cm. long, erect in fruit; calyx-lobes oblanceolate, 4-5 mm. long, 0.5-1.5 mm. broad, glandular-hirsutulous, 6-8 mm. long, 1-3 mm. broad in fruit; corolla lavender to purple with a yellow tube, tubular-funnelform, deciduous, 7-14 mm. long, 5-10 mm. broad, the lobes obovate, 1.5-2 mm. long, 5-10 mm. broad, the whole much longer than the calyx; stamens included, 3-5 mm. long, unequal, the filaments glabrous, the anthers oblong, 0.5-1 mm. long; scales partly adnate to the filaments, the narrow upper part free; style included, 3-4 mm. long, glandular-hirsutulous, cleft at apex; capsule oblong-ovoid, 3-5 mm. long, hirsute; seeds 8-12, ovoid, 1-1.5 mm. long, black, coarsely foveolate.

Burns in chaparral, Transition Zone; central California, Coast Ranges from Lake County to Santa Clara County, and Sierra Nevada foothills in Amador County. Type locality: Petrified Forest, Sonoma County, California. May-Aug.

Phacelia Kéckii Munz & Jtn. Bull. Torrey Club 51: 298. 1924. Basal leaves short-petiolate; corolla usually 10 mm. long or more; ovules usually fewer than in the preceding. Santa Ana Mountains, southern California. Type locality: "along the trail from Glen Ivy to Santiago Peak, Santa Ana Mts."

55. *Phacelia pulchella* A. Gray. Beautiful *Phacelia*. Fig. 4114.

Phacelia pulchella A. Gray, Proc. Amer. Acad. 10: 326. 1875.

Phacelia Gooddingii Brand, Pflanzenreich 4251: 120. 1913.

Annual, 0.5-2 dm. tall from a slender taproot, glandular-puberulent and hirsutulous throughout; stems erect or ascending, profusely branched. Basal leaves alternate, oblong-oval to orbicular, 0.5-2 cm. long, 0.3-2 cm. broad, entire or repand-dentate, obtuse at base with a slender petiole; cauline leaves rather few, like the basal but short-petiolate; flowers numerous, slender-pedicellate in lax, simple or few-branched cymes, the cymes 3-15 cm. long, erect in fruit; calyx-lobes oblanceolate, 3-5.5 mm. long, 0.5-1 mm. broad, glandular-hirsutulous, 5-9 mm. long, 1-2 mm. broad in fruit; corolla purple or violet with the tube yellow at base, campanulate-funnelform, deciduous, 7-14 mm. long, 4-8 mm. broad, the lobes obovate, 1.5-2.5 mm. long, the whole much longer than the calyx; stamens included, 3-5 mm. long, slightly unequal, the filaments sparsely pubescent at base, the anthers oblong-oval, 0.5-0.7 mm. long; scales lanceolate to ovate, attached to the base of the filament; style included, 3.5-5 mm. long, pubescent below the middle, bifid at apex; capsule ovoid to oblong, 3-5 mm. long, hirsutulous; seeds 25-50, roughly ovoid, 0.5-0.75 mm. long, dark brown, coarsely foveolate.

Gravelly slopes, Sonoran Zones; extreme eastern California to southern Nevada, Utah, and adjacent Arizona. Type locality: southern Utah. April-July.

56. *Phacelia rotundifolia* Torr. Roundleaf *Phacelia*. Fig. 4115.

Phacelia rotundifolia Torr. ex S. Wats. Bot. King Expl. 253. 1871.

Annual, 0.5-3 dm. tall from a taproot, glandular-hirsute and hirsutulous throughout; stems erect, branching near the base. Leaves ovate to orbicular, 0.5-2 cm. long and broad, coarsely toothed to lobed, usually subcordate at base, the petiole slender, longer than the blade; cauline leaves like the basal; flowers rather few, pedicellate, in lax cymes, the cymes up to 2 dm. long, erect in fruit; calyx-lobes linear-oblanceolate, 2-4 mm. long, about 0.5 mm. broad, glandular-hirsute, in fruit 5-6 mm. long and up to 1 mm. broad; corolla pale violet to white, often yellowish at base, deciduous, tubular, about 5 mm. long, 2.5-3 mm. broad, the lobes 1-2 mm. long; stamens included, 2-3 mm. long, a little unequal, the filaments glabrous, the anthers oval, about 0.3 mm. long; scales narrow, up to 1 mm. long, free or attached to the base of the filaments; style included, 1.5-2 mm. long, cleft one-third or less, sparsely hirsutulous; capsule oblong, 4 mm. long, puberulent, acute; seeds about 80, oblong-ovoid, less than 0.5 mm. long, brown, coarsely foveolate.

Gravelly slopes, Sonoran Zones; desert ranges, southeastern California to southern Utah and Arizona. Type locality: southern Utah. Collected by Palmer. April-June.

Phacelia mustelina Coville, Journ. Wash. Acad. 27: 196. 1937. Cymes pedunculate; calyx-lobes 3-5 mm. long; corolla violet, tubular-campanulate, 6-10 mm. long, 4-8 mm. broad; stamens 3-6 mm. long, the filaments pubescent, the anthers about 0.5 mm. long; style 3-5 mm. long; seeds about 0.5 mm. long. Mountains bordering Death Valley, in California and Nevada. Type locality: Titus Canyon, Grapevine Mountains, Inyo County, California.

Phacelia Peirsoniana J. T. Howell, Leaflets West. Bot. 3: 117. 1942. Cymes subsessile; calyx-lobes 3-4 mm. long, up to 8 mm. long in fruit; corolla dull purple to white, tubular-campanulate, about 5 mm. long, 3-4 mm. broad; stamens 2.5-3.5 mm. long, the filaments slightly hairy at the base, the anthers about 0.5 mm. long; style 2-3 mm. long; seeds 1-1.5 mm. long. Desert mountains, eastern California to southern Nevada. Type locality: Little Round Valley, Mono County, California.

Phacelia Barnebyana J. T. Howell, Leaflets West Bot. 3: 191. 1942. Annual, 0.5-1.5 dm. tall; leaves

oblong-oval to ovate, 0.5–1.5 cm. long, about 0.5 cm. broad, entire to serrate; flowers few, slender-pedicellate in elongate cymes; corolla pale lavender, tubular-campanulate, about 5 mm. long; stamens included, the filaments glabrous; scales linear to obsolete; style included, glabrous; seeds ovoid, about 1 mm. long. Desert ranges, eastern San Bernardino and Inyo Counties, California to Nevada. Type locality: Clark Mountain, San Bernardino County, California.

57. *Phacelia Lemmonii* A. Gray. Lemmon's *Phacelia*. Fig. 4116.

Phacelia Lemmonii A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 417. 1886.

Phacelia heterosperma Parish, Bot. Gaz. 13: 37. 1888.

Phacelia polysperma Brand, Pflanzenreich 4²⁵¹: 119. 1913.

Annual, 0.5–2 dm. tall from a slender taproot, glandular-puberulent or hirsutulous throughout; stems erect, usually branched above the base. Leaves alternate, oblong-oval to broadly ovate, 1–2.5 cm. long, 0.5–2 cm. broad, repand to dentately lobed, cuneate or obtuse at base, with a rather short petiole; cauline leaves numerous, like the basal; flowers numerous, short-pedicellate in dense, elongate cymes, the cymes 5–20 cm. long, erect in fruit; calyx-lobes oblong to oblanceolate, 2.5–4 mm. long, 0.3–1 mm. broad, unequal, glandular-hirsutulous, 5–7 mm. long, 0.5–2 mm. broad in fruit; corolla pale purple to white, narrowly campanulate, deciduous, 4–6 mm. long, 3–4 mm. broad, the lobes oval, 1–2 mm. long, the whole a little longer than the calyx; stamens included, 2–3 mm. long, the filaments glabrous, the anthers about 0.25 mm. long; scales oval to narrowly oblanceolate, or obsolete, free from the filament; style included, 2–2.5 mm. long, glandular-pubescent at base, cleft one-quarter or less; capsule oblong or ovoid, 3–4 mm. long, glandular-hirsutulous; seeds about 100, roughly ovoid, about 0.5 mm. long, dark brown, coarsely foveolate.

Moist places in desert ranges, Sonoran Zones; eastern and southern California to western Nevada and central Arizona. Type locality: plains at Mineral Park, northwestern Arizona. March–July.

58. *Phacelia Parishii* A. Gray. Parish's *Phacelia*. Fig. 4117.

Phacelia Parishii A. Gray, Proc. Amer. Acad. 19: 88. 1883.

Annual, 1–1.5 dm. tall from a slender taproot, glandular-puberulent or -hirsutulous throughout; stems diffusely branched. Basal leaves alternate, oblong to obovate, 1–3 cm. long, 0.5–2 cm. broad, entire to shallowly dentate, tapering at base into a petiole of about equal length; cauline leaves few, like the basal but short-petiolate to sessile; flowers numerous, short-pedicellate in dense, pedunculate cymes, the cymes 2–3 cm. long, erect in fruit; calyx-lobes oblong to obovate, 3.5–4.5 mm. long, 1–2.5 mm. broad, unequal, glandular-hirsutulous, 6–7.5 mm. long, 1.5–4 mm. broad in fruit; corolla lavender with a yellow-based tube, narrowly campanulate, deciduous, 5–6 mm. long, 3–4 mm. broad, the lobes about 1 mm. long; stamens included, 2.5–3.5 mm. long, the filaments pubescent at base, the anthers oval, 0.5 mm. long; scales semioval or variable; style included, 1.5–2 mm. long, cleft one-third or less; capsule oblong-ovoid, about 4 mm. long, hirsutulous; seeds about 25, oblong-ovoid, 1–1.3 mm. long, dark brown to black, finely foveolate.

Desert slopes, usually alkaline, Sonoran Zones; Mojave Desert, California, to Nevada. Type locality: Rabbit Springs, Mojave Desert, California. April–July.

59. *Phacelia saxicola* A. Gray. Rock *Phacelia*. Fig. 4118.

Phacelia saxicola A. Gray, Proc. Amer. Acad. 20: 169. 1884.

Annual, 0.5–1.5 dm. tall from a slender taproot, glandular-hispid throughout; stems erect or ascending, diffusely branched. Basal leaves alternate, oblanceolate to spatulate, 5–7 mm. long, 2–4 mm. broad, entire, tapering at base into a petiole of about equal length; cauline leaves like the basal; flowers rather few, short-pedicellate in lax, few-branched cymes, the cymes 5–8 cm. long, erect in fruit; calyx-lobes linear to narrowly oblanceolate, 3–4 mm. long, 0.5–0.75 mm. broad, subequal, united for the basal 1 mm., glandular-hispid, 5–7 mm. long, 0.5–1.5 mm. broad in fruit; corolla bluish with a white tube, narrowly campanulate, marcescent, 3–4 mm. long, 1.5–2 mm. broad, the lobes oval, about 1 mm. long; stamens included, 1.5–2 mm. long, the filaments glabrate, the anthers oval, 0.25 mm. long; scales small, linear; style included, 1.5 mm. long, cleft about one-fourth; capsule ovoid, 2.5 mm. long, hispid; seeds 40–55, orbicular, flattened, 0.3–0.4 mm. long, black, shallowly pitted or smooth.

Desert ranges, usually in limestone soil, Sonoran Zones; eastern California to southern Nevada and northern Arizona. Type locality: Kingman Station, northern Arizona. April–Aug.

60. *Phacelia Parryi* Torr. Parry's *Phacelia*. Fig. 4119.

Phacelia Parryi Torr. Bot. Mex. Bound. 144. 1859.

Phacelia Parryi var. *celata* Jepson & Hoover ex Jepson, Fl. Calif. 3: 276. 1943.

Annual, 1.5–6.5 dm. tall from a taproot, glandular-hispid and puberulent throughout; stem simple or sparingly branching. Basal leaves alternate, oblong-ovate to broadly ovate, 2–5 cm. long, 1–4 cm. broad, obtuse, truncate or cordate at base, coarsely dentate, doubly dentate, or lobed, the petiole usually longer than the blade; cauline leaves shorter-petiolate; flowers few, long-pedicellate in lax open cymes, the cymes simple or few-branched, 1–3 dm. long, erect in fruit; the fruiting pedicels 1–2.5 cm. long, spreading horizontally or curved; calyx-lobes linear-oblong, 5–8 mm. long, 1 mm. broad, somewhat enlarged in fruit; corolla violet with a white- or yellow-marked center, pelviform or subrotate, deciduous, 1–2 cm. long, 1.5–3 cm. broad, the lobes obovate, 5–10 mm. long, the whole much longer than the calyx; stamens equaling or a little longer than the corolla, 1–2 cm. long, the filaments pubescent, with a hairy quadrate dilation at base; style 0.8–2 cm. long, pubescent, cleft one-third to one-half; capsule



4113



4114



4115



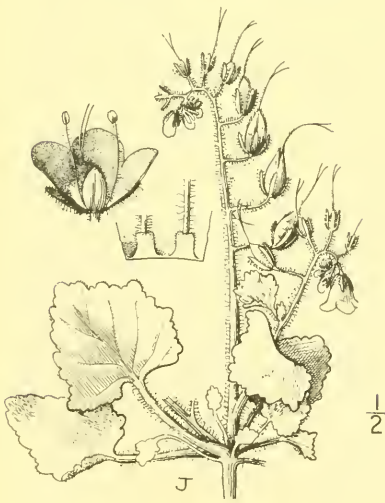
4116



4117



4118



4119



4120

4113. *Phacelia suaveolens*
4114. *Phacelia pulchella*
4115. *Phacelia rotundifolia*

4116. *Phacelia Lemmonii*
4117. *Phacelia Parishii*
4118. *Phacelia saxicola*

4119. *Phacelia Parryi*
4120. *Phacelia longipes*

oblong-ovoid, 6–10 mm. long, acuminate; seeds 50–60, ovoid-angled, 0.6–0.8 mm. long, dark brown, coarsely foveolate.

Dry slopes and in disturbed soil, Transition and Sonoran Zones; coastal southern California, from southern Monterey County to northern Lower California; western Colorado Desert. Type locality: mountains east of San Diego. March–May.

Phacelia Nashiana Jepson, Fl. Calif. 3: 276. 1943. Plants low, the main stem stout and leafy; stamens shorter than or equaling the corolla, the basal dilation with an acute apical tooth. Canyons on the eastern slope of the Sierra Nevada, Inyo County, California. Type locality: Nine-mile Canyon, Inyo County.

61. *Phacelia longipes* Torr. Long-stalked *Phacelia*. Fig. 4120.

Phacelia longipes Torr. ex A. Gray, Proc. Amer. Acad. 10: 322. 1875.

Annual, 1–4 dm. tall from a taproot, glandular-hirsute or -hirsutulous throughout; stem branching from the base or above, prostrate or ascending. Basal leaves alternate, ovate to sub-orbicular, 1.5–4 cm. long, 1–2.5 cm. broad, obtuse, cordate at base, crenate or crenate-dentate, the petiole longer than the blade; flowers few, long-pedicellate in lax, open cymes, the cymes simple or few-branched, 0.5–2 dm. long, erect in fruit, the fruiting pedicels 0.5–1 cm. long, spreading horizontally or curved; calyx-lobes linear-oblong, 3–6 mm. long, 0.5–1 mm. broad, somewhat enlarged in fruit; corolla subrotate, white or rarely blue, deciduous, 0.7–1.2 cm. long and broad, the lobes obovate, 3–6 mm. long; stamens exserted, 1–1.5 mm. long, the filaments pubescent with an ovate or narrowly deltoid, glabrous dilation at base, the anthers oblong, about 1 mm. long; style 0.8–1.5 cm. long, pubescent, divided about one-half; capsule oblong-ovoid, 5–6 mm. long, acuminate; seeds 8–15, oblong-ovoid, 1–1.5 mm. long, brown, coarsely foveolate.

Dry slopes, Transition and Sonoran Zones; coastal southern California, from Santa Barbara County to Riverside County; northwestern Colorado Desert. Type locality: Santa Barbara County, California. April–July.

62. *Phacelia minor* (Harv.) Thell. California Bluebells. Fig. 4121.

Whitlavia grandiflora Harv. Lond. Journ. Bot. 5: 312. pl. 11. 1846. Not *Phacelia grandiflora* (Benth.) A. Gray.

Whitlavia minor Harv. op. cit. pl. 12.

Phacelia Whitlavia A. Gray, Proc. Amer. Acad. 10: 322. 1875.

Phacelia Whitlavia var. *Jonesii* Brand, Pflanzenreich 4²⁶¹: 71. 1913.

Phacelia minor Thell. ex Zimm. Ber. Bayer. Bot. Ges. 14: 79. 1914.

Annual, 2–6.5 dm. tall from a taproot, glandular-hispid throughout; stem simple or branching. Basal leaves alternate, oblong-ovate to broadly ovate, 2–7 cm. long, 1.5–6 cm. broad, obtuse, truncate or cordate at base, coarsely and usually doubly dentate or serrate, the petiole longer than the blade; cauline leaves shorter-petiolate; flowers several to numerous, long-pedicellate in lax, open cymes, the cymes simple or few-branched, 1–4 dm. long, erect in fruit, the fruiting pedicels 1–4 cm. long, spreading horizontally or curved; calyx-lobes linear-oblong, 5–10 mm. long, 1 mm. broad, somewhat enlarged in fruit; corolla violet (rarely white), tubular-campanulate, slightly constricted at the throat, 1.5–4 cm. long, 1–3 cm. broad, the lobes obovate, 3–8 mm. long; stamens a little exserted, 2–4.5 cm. long, the filaments with an oblong pubescent dilation at base, the anthers oblong, 1.5–2 mm. long; style 2–3.5 cm. long, pubescent, divided one-fourth to one-third; capsule oblong-ovoid, 8–12 mm. long, acuminate; seeds about 100, ovoid-angled, 0.8–1 mm. long, dark brown, coarsely foveolate.

Dry and often disturbed or burned soil, Sonoran Zones; coastal southern California, from Los Angeles County to Riverside and San Diego Counties, and the northwestern Colorado Desert. Type locality: "California." Collected by Coulter. Feb.–June.

63. *Phacelia campanulària* A. Gray. Desert Bluebells. Fig. 4122.

Phacelia campanularia A. Gray, Syn. Fl. N. Amer. 2¹: 164. 1878.

Annual, 1–5 dm. tall from a taproot, glandular-hispid throughout; stem usually branching from the base. Basal leaves alternate, oblong-ovate to suborbicular, 1.5–7.5 cm. long, 1–5 cm. broad, crenate to dentate or serrate, obtuse, truncate or cordate at base, the petiole longer than the blade; cauline leaves shorter-petiolate; flowers several to numerous, long-pedicellate in lax, open cymes, the cymes simple or few-branched, 1–3 dm. long, erect in fruit, the fruiting pedicels 1–2.5 cm. long, spreading horizontally; calyx-lobes linear-oblong, 4–12 mm. long, 0.5–2 mm. broad, somewhat accrescent; corolla blue (rarely white), funnellform-campanulate, deciduous, 1.5–4 cm. long, 1–4 cm. broad, the lobes obovate, 4–10 mm. long, the whole much longer than the calyx; stamens usually a little exserted, 2–4.5 cm. long, the filaments with a quadrate glabrous or pubescent dilation at base, the anthers oblong, 1–1.5 mm. long; style 1.5–3.5 cm. long, pubescent, divided one-fourth to one-third; capsule oblong-ovoid, 8–12 mm. long, acuminate; seeds many (50–70?), oblong-ovoid, 1–1.5 mm. long, brown, coarsely foveolate.

Rocky hillsides and sandy washes, Sonoran Zones; Mojave and Colorado Deserts and interior southern California. Type locality: San Bernardino and San Diego Counties, California. March–June.

64. *Phacelia viscida* (Benth.) Torr. Sticky *Phacelia*. Fig. 4123.

Eutoca viscida Benth. ex Lindl. Bot. Reg. 21: pl. 1808. 1836.

Eutoca albiflora Nutt. Journ. Acad. Phila. II. 1: 158. 1848.

Phacelia viscida Torr. Bot. Mex. Bound. 143. 1859.

Annual, 0.5–8 dm. tall from a taproot, glandular-hirsute throughout; stem erect, simple

or sparsely branched. Basal leaves alternate, ovate to ovate-orbicular, 4-9 cm. long, 3-7 cm. broad, doubly serrate to coarsely and irregularly dentate, obtuse, truncate or cuneate at base, the petiole usually shorter than the blade; cauline leaves like the basal but shorter-petiolate to sessile; flowers rather numerous, the pedicels unequal and some of them slender, in lax, simple, or few-branched cymes, the cymes 1-1.5 dm. long, erect in fruit; calyx-lobes linear-oblong to narrowly spatulate, 5-6 mm. long, 1-1.5 mm. broad, glandular-hirsute, in fruit up to 10 mm. long, 2 mm. broad; corolla blue with a white or purplish center, or entirely white, pelviform to subrotate, deciduous, 8-18 mm. long and broad, the lobes obovate, 5-10 mm. long, the filaments sparingly pilose; scales none; style included, 5-12 mm. long, cleft one-half to two-thirds; capsule oblong-ovoid, 8-12 mm. long, acuminate, glandular-hirsute and flattened at apex; seeds 40-80 (?), irregularly ovoid, 0.5-0.75 mm. long, brown, rather finely foveolate.

Dry soil in open places, Sonoran Zones; coastal California from southern Monterey County to San Diego County, and adjacent islands. Type locality: "California." Collected by Douglas. March-June.

65. *Phacelia grandiflora* (Benth.) A. Gray. Large-flowered Phacelia. Fig. 4124.

Eutoca grandiflora Benth. Trans. Linn. Soc. 17: 278. 1835.

Eutoca speciosa Nutt. Journ. Acad. Phila. II. 1: 158. 1848.

Phacelia grandiflora A. Gray, Proc. Amer. Acad. 10: 321. 1875.

Annual, 5-10 dm. tall from a taproot, glandular-hirsute or -hispid throughout; stem erect, simple or sparsely branched above. Basal leaves alternate, ovate to ovate-orbicular, 4-10 cm. long, 3-9 cm. broad, shallowly dentate and often serrate, obtuse, truncate or cordate at base, the petiole usually shorter than the blade; cauline leaves like the basal but shorter-petiolate to sessile; flowers numerous, short-pedicellate, in rather dense, simple or few-branched cymes, the cymes 1-3 dm. long, erect in fruit; calyx-lobes oblong to oblanceolate, 7-8 mm. long, 1.5-2 mm. broad, glandular-hirsute, in fruit up to 10 mm. long, 2 mm. broad; corolla pale purplish blue or white to the center, pelviform to subrotate, deciduous, 12-25 mm. long, 30-50 mm. broad, the lobes obovate, 7-12 mm. long, the whole greatly exceeding the calyx; stamens included, 7-18 mm. long, the filaments glabrous, the anthers oblong, about 1.5 mm. long; scales obsolete; style included, 10-20 mm. long, cleft about three-fourths; capsule oblong-ovoid, 8-12 mm. long, acuminate, glandular-hirsute at apex; seeds 75-100 (?), oblong-ovoid, 0.75-1 mm. long, light brown, coarsely foveolate.

Dry canyons, Sonoran Zones; coastal southern California from Santa Barbara County to northern Lower California. Type locality: California. Collected by Douglas. April-June.

66. *Phacelia calthifolia* Brand. Caltha-leaf Phacelia. Fig. 4125.

Phacelia calthifolia Brand, Jahresb. Kgl. Gymnas. Sorau Beilage 8. 1911.

Annual, 1-3.5 dm. tall, the branches few to several, ascending, glandular-hirsutulous throughout. Basal leaves suborbicular, usually cordate, 1.5-3 cm. in diameter, crenulate or crenulate-dentate, the stout petioles usually exceeding the blades; cauline leaves few, like the basal; flowers rather numerous, short-pedicellate in dense cymes, the inflorescence exceeding the foliage, the cymes up to 7 cm. long and erect in fruit; calyx-lobes oblong, 3-4 mm. long, up to 1 mm. broad, subequal, densely glandular-hirsutulous, in fruit up to 5 mm. long, a little shorter than the capsule; corolla purple, broadly campanulate, deciduous, about 1-1.5 cm. long, 1.5-2 cm. broad, the lobes orbicular, 2-3 mm. long, the whole two or three times the length of the calyx; stamens included, 5-6 mm. long, unequal, the filaments pubescent, the anthers oblong; scales lanceolate to ovate, 2-3 mm. long, attached to the filaments at the base; style included, 5-6 mm. long, divided about to the middle; capsule ovoid-globose, about 5 mm. long, viscid-hirsutulous; seeds about 50, ovoid, about 1 mm. long, brown, transversely corrugated.

Alkaline flats, Sonoran Zones; Death Valley and the northern Mojave Desert, California, to adjacent Nevada. Type locality: Panamint Mountains, California. March-May.

67. *Phacelia pachyphylla* A. Gray. Thick-leaf Phacelia. Fig. 4126.

Phacelia pachyphylla A. Gray, Proc. Amer. Acad. 19: 88. 1883.

Annual, 1-1.5 dm. tall, the branches few, ascending, glandular-hirsutulous throughout. Basal leaves oval to orbicular, cordate, 2-2.5 cm. in diameter, entire or crenulate, the slender petioles usually exceeding the blades; cauline leaves few, like the basal; flowers numerous, subsessile, in dense terminal cymes, the inflorescence exceeding the foliage, the cymes in fruit up to 5 cm. long and erect; calyx-lobes oblong, 2-3 mm. long, subequal, densely glandular-hirsutulous, in fruit up to 5 mm. long, a little shorter than the capsule; corolla violet or purple, funnelform-campanulate, deciduous, 5-7 mm. long and broad, the lobes orbicular, 1.5-2 mm. long, the whole twice the length of the calyx; stamens included, 2.5-4 mm. long, the filaments pubescent, the anthers oval; scales linear, 1-2 mm. long; style included, 2-3 mm. long, divided nearly to the middle, viscid-hirsutulous; capsule ovoid-globose, about 5 mm. long, glandular-puberulent; seeds more than 100, oblong-ovoid, 1-1.25 mm. long, brown, transversely corrugated.

Alkaline flats, Sonoran Zones; Mojave and Colorado Deserts, California. Type locality: near Calico Mines, Mojave Desert, California. April-May.

Phacelia neglecta M. E. Jones, Contr. West. Bot. 12: 50. 1908. Plants smaller and more compact, the inflorescence partially concealed by the foliage; corolla white, 5 mm. long. Mojave and Colorado Deserts, California, to adjacent Nevada and Arizona. Type locality: Needles, California.

68. *Phacelia Ivesiana* Torr. Ives's *Phacelia*. Fig. 4127.

Phacelia Ivesiana Torr. Ives Rep. 21. 1860.

Phacelia campestris A. Nels. Bull. Torrey Club 26: 242. 1899.

Phacelia Ivesiana var. *pediculoides* J. T. Howell, Amer. Midl. Nat. 36: 401. 1946.

Annual, 0.5–3 dm. tall, the numerous branches prostrate or ascending from the base, hirsutulous throughout and slightly glandular. Basal leaves linear-oblong, 1.5–4 cm. long, 0.5–1.5 cm. broad, pinnately lobed, the lobes usually obtuse and entire, the petioles slender, usually exceeding the blades; flowers rather few, short-pedicellate in short, lax, simple, or few-branched cymes, the inflorescence little exceeding the foliage, in fruit the cymes up to 6 cm. long and erect; calyx-lobes linear or linear-oblancoolate, unequal, 3–5 mm. long, about 0.5 mm. broad, hirsute on the margins, the tips often spreading or recurved, in fruit up to 6 mm. long and slightly exceeding the capsule; corolla white or purplish, broadly funnelform, deciduous, 2–4 mm. long and broad, the lobes oval, 0.5–1 mm. long, the whole shorter than to about equaling the calyx; stamens included, 1–2 mm. long, the filaments glabrous, the anthers oval; scales very narrow or obsolete; style included, 1–1.5 mm. long, divided about one-fourth, glabrous; capsule oblong-ovoid, 3–5 mm. long, obtuse, hispidulous near the summit; seeds 10–15, oblong, 1–1.25 mm. long, brown, coarsely transversely corrugated.

Sandy soil, Sonoran Zones; deserts of southeastern California to Wyoming, Utah, Arizona, and New Mexico. Type locality: Diamond River, Arizona. March–June.

Phacelia glandulifera Piper, Contr. U.S. Nat. Herb. 11: 472. 1906. (*Phacelia luteopurpurea* A. Nels. Bot. Gaz. 52: 271. 1911.) Plants glandular throughout; leaves usually bipinnatifid; all parts usually a little larger. Central Washington and Oregon to Idaho and northwestern Nevada. Type locality: Pasco, Franklin County, Washington.

69. *Phacelia affinis* A. Gray. Purple-bell *Phacelia*. Fig. 4128.

Phacelia affinis A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 417. 1886.

Phacelia rugulosa Lemmon ex Greene, Pittonia 1: 175. 1888.

Phacelia affinis var. *patens* J. T. Howell, Amer. Midl. Nat. 36: 389. 1946.

Annual, 1–3 dm. tall, the branches few to several, ascending, glandular and puberulent to hispidulous throughout. Basal leaves narrowly oblong, 2–6 cm. long, 0.5–2 cm. broad, pinnatifid, or pinnately lobed, the obtuse divisions few-toothed, the petioles slender, usually shorter than the blades; cauline leaves like the basal, the upper subsessile; flowers numerous or few, short-pedicellate to subsessile in simple or few-branched cymes, usually dense cymes, the cymes up to 15 cm. long and erect in fruit, exceeding the foliage; calyx-lobes spatulate, 4–5 mm. long, 1 mm. broad, glandular-hirsutulous and hirsute-ciliate, in fruit up to 6 or 8 mm. long, erect, exceeding the capsule; corolla pale purplish to nearly white, narrowly campanulate, deciduous, 2.5–4.5 mm. long, 2–3 mm. broad, the lobes oval, about 1 mm. long, the whole about equaling the calyx; stamens included, unequal, about 2 mm. long, the filaments glabrous, the anthers oval; scales inconspicuous or obsolete; style included, about 2 mm. long, cleft one-fourth or less, glabrous; capsule oblong, obtuse, 4–5 mm. long, hispid near the apex; seeds about 20, oblong-ovoid, nearly 1 mm. long, brown, reticulate and transversely corrugated.

Desert slopes, Lower Sonoran Zone; western edge of the Colorado Desert, southern California, to southern Nevada, Utah, Arizona, and northern Lower California. Type locality: mountains of Lower California, not far from the United States boundary. March–June.

70. *Phacelia bicolor* Torr. Two-colored *Phacelia*. Fig. 4129.

Phacelia bicolor Torr. ex S. Wats. Bot. King Expl. 255. 1871.

Annual, 0.5–2 dm. tall, the branches prostrate or ascending, glandular-hirsutulous throughout. Basal leaves oblong, 2–4 cm. long, 0.5–1.5 cm. broad, bipinnatifid, the divisions linear, the petioles slender, usually shorter than the blades; cauline leaves like the basal; flowers few to numerous, pedicellate in simple or few-branched cymes, the cymes rather lax to moderately dense, in fruit up to 1 cm. long and erect; calyx-lobes linear to linear-oblancoolate, 4–6 mm. long, 0.5–1.5 mm. broad, glandular-hirsutulous and hirsute-ciliate, in fruit up to 10 mm. long and much longer than the capsule; corolla with a purplish limb and a yellow tube, funnelform to campanulate, 8–15 mm. long, 5–12 mm. broad, the lobes orbicular, 2–3 mm. long, the whole 2 or more times the length of the calyx; stamens included, 5–8 mm. long, unequal, the filaments usually pubescent below, the anthers oval; scales wholly adnate, attached to the filaments for one-half their length, or only at base; style included, 4–5 mm. long, cleft about one-fifth, pubescent; capsule oblong-ovoid, about 4 mm. long, obtuse, hispid at the apex; seeds about 15, ovoid, about 1.5 mm. long, dark brown, coarsely foveolate and transversely corrugated.

Sandy soil, usually in the shade of shrubs, Boreal and Transition Zones; central and southeastern Oregon to northeastern California and western Nevada; east slope of the Sierra Nevada to Inyo County. Type locality: near Carson City, Nevada. May–Aug.

Phacelia Leibergeri Brand, Pflanzenreich 4253: 128. 1913. (*Phacelia adspersa* Brand, Rep. Spec. Nov. 17: 319. 1921.) Corolla narrowly campanulate; calyx-lobes, stamens and styles a little longer, the scales smaller, and the ovules more numerous. Central and southeastern Oregon. Type locality: between Prineville and Bear Buttes, Oregon. May–Aug.

71. *Phacelia brachyloba* (Benth.) A. Gray. Short-lobed *Phacelia*. Fig. 4130.

Eutoca brachyloba Benth. Trans. Linn. Soc. 17: 277. 1835.

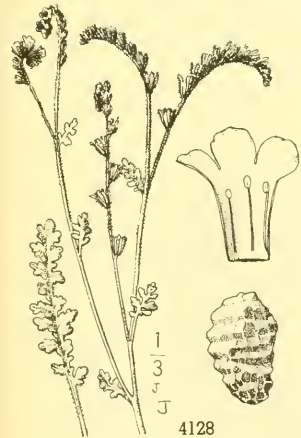
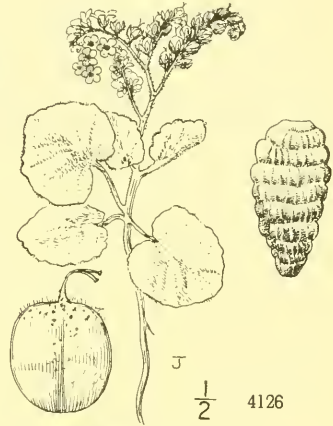
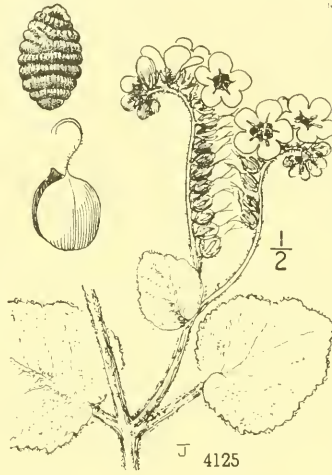
Phacelia brachyloba A. Gray, Proc. Amer. Acad. 10: 324. 1875.

Phacelia Cooperae A. Gray, op. cit. 15: 49. 1879.

Phacelia Orcuttiana A. Gray, op. cit. 19: 88. 1883.

Phacelia leucantha Lemmon ex Greene, Pittonia 1: 175. 1888.

Annual, 1–5 dm. tall, the branches numerous, erect, hispidulous, the stems and inflorescence



4121. *Phacelia minor*
4122. *Phacelia campanularia*
4123. *Phacelia viscida*

4124. *Phacelia grandiflora*
4125. *Phacelia calthifolia*
4126. *Phacelia pachyphylla*

4127. *Phacelia Ivesiana*
4128. *Phacelia affinis*
4129. *Phacelia bicolor*

glandular. Basal leaves narrowly oblong to oblong-oval, 2.5–8 cm. long, 1–2.5 cm. broad, pinnatifid or pinnately lobed, the usually obtuse divisions few-toothed or entire, the petioles slender, shorter than the blades; cauline leaves like the basal, or more shallowly lobed; flowers numerous, short-pedicellate in paniculately clustered cymes, the cymes dense, up to 2 cm. long and erect in fruit; calyx-lobes spatulate, 4–5 mm. long, 1–1.5 mm. broad, unequal, glandular-hispidulous and hirsute-ciliate, in fruit little if at all enlarged and only slightly exceeding the capsule; corolla white to lavender with a yellow throat, broadly funneliform to campanulate, deciduous, 8–12 mm. long and broad, the lobes orbicular, about 3 mm. long, the whole twice as long as the calyx; stamens a little longer than the corolla-tube, about 4 mm. long, unequal, the filaments glabrous, the anthers oval, about 0.6 mm. long; scales usually obsolete, the corolla-throat areolate; style included, 3–4 mm. long, bifid at apex, pubescent toward base; capsule oblong-ovoid, 4–5 mm. long, obtuse, thinly hispidulous; seeds about 20, ovoid, about 0.5 mm. long, dark brown, foveolate and transversely corrugated.

Sandy soil, especially on burned slopes, Transition and Sonoran Zones; Monterey County to San Diego County, California, east to the mountains bordering the western edge of the Mojave and Colorado Deserts. Type locality: California. Collected by Douglas. May–June.

72. *Phacelia Fremontii* Torr. Fremont's *Phacelia*. Fig. 4131.

Phacelia Fremontii Torr. Ives Rep. 21. 1860.

Phacelia Brannanii Kell. Proc. Calif. Acad. 7: 90. 1877.

Phacelia Hallii Brand, Jahreshb. Kgl. Gymnas. Sorau Beilage 8. 1911.

Annual, 1–3 dm. tall, the branches few to numerous, ascending, puberulent to hirsutulous, the inflorescence glandular. Basal leaves oblong to oblong-oval, 2–6 cm. long, 0.5–2 cm. broad, pinnatifid, the divisions entire, toothed or lobed, the petioles slender, shorter than the blades; cauline leaves like the basal; flowers numerous, short-pedicellate to subsessile in dense simple or few-branched cymes, the cymes up to 1.5 cm. long and erect in fruit; calyx-lobes spatulate, 3–6 mm. long, 0.5–2 mm. broad, glandular-hirsutulous, in fruit up to 8 mm. long; corolla with a bright blue to nearly white limb and a yellow tube, broadly funneliform to campanulate, deciduous, 8–15 mm. long, 10–18 mm. broad, the lobes orbicular, 2–5 mm. long, the whole 2 or more times the length of the calyx; stamens included, 3–8 mm. long, unequal, the filaments glabrous, the anthers oval; scales linear-lanceolate, wholly adnate, free from the filaments or adherent only at base; style included, 3–5 mm. long, cleft about one-fifth, pubescent; capsule oblong-ovoid, 3–5 mm. long, hispid near the apex, obtuse; seeds about 12, ovoid, 1–1.25 mm. long, dark brown, transversely corrugated.

Under shrubs or on open flats, Transition and Sonoran Zones; Mojave Desert, California; north in the Tehachapi Mountains and the Inner South Coast Ranges to the vicinity of Coalinga; east to southern Nevada, Utah, and Arizona. Type locality: Yampai Valley, Arizona. March–May.

73. *Phacelia gymnoclada* Torr. Naked-stem *Phacelia*. Fig. 4132.

Phacelia gymnoclada Torr. ex S. Wats. Bot. King Expl. 255. 1871.

Annual, 0.5–2 dm. tall, the branches diffuse, hirsutulous throughout and somewhat glandular. Basal leaves oblong to oval, 1–2.5 cm. long, 0.5–1.5 cm. broad, shallowly pinnately lobed, the petioles slender, often exceeding the blades; cauline leaves few, subtending the inflorescence, like the basal or entire; flowers few, pedicellate in lax simple cymes, the cymes in fruit up to 4 cm. long and erect, the lower pedicels sometimes reflexed; calyx-lobes linear to linear-spatulate, 3–5 mm. long, about 0.5 mm. broad, unequal, hirsutulous, in fruit up to 6 or 8 mm. long; corolla funneliform-campanulate, the limb violet, the tube yellowish, deciduous, 6–9 mm. long, 4–8 mm. broad, the lobes oval, 1–2 mm. long, the whole about twice the length of the calyx; stamens included, 3–6 mm. long, unequal, the filaments glabrous, the anthers oval; scales inconspicuous, adnate to the base of the filaments; style included, 3–4 mm. long, cleft about one-fourth, pubescent; capsule oblong-ovoid, 3–4 mm. long, obtuse, hirsutulous near the apex; seeds 5–8, oblong-ovoid, brown, 1–1.5 mm. long, foveolate and transversely corrugated.

Dry slopes, Transition Zone; southeastern Oregon to Inyo County, California, and northern Nevada. Type locality: Truckee, Trinity, and West Humboldt Mountains, Nevada. May–June.

Phacelia crassifolia Torr. ex S. Wats. Bot. King Expl. 255. 1871. Leaves rather uniformly distributed, dentate, the cauline mostly opposite; scales very narrow; seeds 4–8. Southeastern Oregon and northwestern Nevada. Type locality: "Lower valley of the Reese River, Nevada."

6. *MILTITZIA* A. DC. Prod. 9: 296. 1845.

Low, diffuse, ascending, or erect, usually glandular-viscid annuals from slender tap-roots. Leaves alternate or some of them opposite, the basal usually forming a rosette, petiolate, entire to pinnatifid or pinnate. Flowers in short and compact to filiform and lax, simple or branched terminal scorpioid cymes, pedicellate. Calyx divided nearly to the base, the lobes subequal, linear or oblong to oblanceolate. Corolla yellow or purplish-tinged (whitish in one species), withering-persistent and enclosing the capsule, campanulate, shorter or longer than the calyx, shallowly to more deeply lobed. Stamens included, subequal to unequal, equally inserted on the base of the corolla-tube, the anthers oval to orbicular. Style persistent, usually included in flower, often exerted after anthesis, 2-cleft or subentire. Mature capsule unilocular or nearly bilocular by the intrusion of the placenta, oblong to nearly globose, acute, loculicidally dehiscent. Ovules several to numerous on the two prominent, linear placenta, laterally attached but nearly sessile. Seeds oblong

to ovoid, transversely corrugated. [Named in honor of Friederich von Miltitz, a botanical writer of the nineteenth century.]

A genus of about 6 species, of the Great Basin of the western United States. Type species, *Eutoca* ? *lutea* Hook. & Arn.

Flowers 5-merous; corolla yellow, or purplish-tinged, equaling or exceeding the calyx; style 1-4 mm. long, the branches evident.

Corolla-lobes conspicuously shorter than the tube; corrugations of the seed prominent.

Flowers numerous, crowded, short-pedicellate; corolla 5-8 mm. long, the scales usually evident; style 1.5-4 mm. long.

Flowers few, slender-pedicellate; corolla 3-3.5 mm. long, the scales obsolete; style about 1 mm. long.

Corolla-lobes nearly equaling the tube; seeds finely striate.

Flowers 4-merous; corolla whitish, shorter than the calyx; style less than 0.5 mm. long, the branches obsolete.

1. *M. lutea*.
2. *M. inyoensis*.
3. *M. parviflora*.
4. *M. pusilla*.

1. *Miltitzia lutea* (Hook. & Arn.) A. DC. Large-flowered *Miltitzia*. Fig. 4133.

Eutoca ? *lutea* Hook & Arn. Bot. Beechey 373. 1838.

Miltitzia lutea A. DC. Prod. 9: 296. 1845.

Emmenanthe lutea A. Gray, Proc. Amer. Acad. 10: 328. 1875.

Phacelia lutea J. T. Howell, Leaflets West. Bot. 4: 15. 1944.

Phacelia lutea var. *purpurascens* J. T. Howell, Proc. Calif. Acad. 25: 365. 1944.

Plants diffuse, the branches 0.5-1 dm. long, prostrate-spreading to erect from a basal rosette, short-hispid and glandular-viscid throughout to subglabrate. Leaf-blades oblong to oval, 1-3 cm. long, 0.5-1 cm. broad, entire to crenate or shallowly toothed, cuneate at base, with a slender petiole; cymes many-flowered and rather compact, the pedicels 2-4 mm. long in fruit; calyx-lobes oblong to narrowly oblanceolate, 4-6 mm. long; corolla yellow, 5-8 mm. long, 4-7 mm. broad, conspicuously exceeding the calyx, glabrous within, the lobes 1-2 mm. long, broadly oval; filaments glabrous, the anthers oval; style 2-4 mm. long, the short branches erect or ascending; capsule oblong to ovoid, 6 or 7 mm. long; seeds about 8, oblong-ovoid, brown, 1-1.5 mm. long.

Dry slopes, Arid Transition and Upper Sonoran Zones; central and southeastern Oregon to adjacent Idaho and Nevada. Type locality: "Snake Fort, Snake Country." May-July.

Miltitzia glandulifera (Torr.) Heller, Muhlenbergia 8: 20. 1912. (*Emmenanthe glandulifera* Torr. ex S. Wats. Bot. King Expl. 257. 1871; *Miltitzia glandulifera* var. *californica* Brand, Univ. Calif. Pub. Bot. 4: 224. 1912; *Phacelia adenophora* J. T. Howell, Leaflets West. Bot. 4: 15. 1944.) Leaf-blades usually pinnatifid or partially pinnate; corolla 4-7 mm. long, hairy within, much exceeding the calyx, the scales evident; filaments hairy. Sandy soil of dry sagebrush plains, Arid Transition and Upper Sonoran Zones; southeastern Oregon to northeastern California and western Nevada. Type locality: Virginia Mountains, Nevada. May-July.

Miltitzia scopulina (A. Nels.) Rydb. Bull. Torrey Club 40: 479. 1913. (*Emmenanthe scopulina* A. Nels. Bull. Torrey Club 25: 380. 1898; *Phacelia scopulina* J. T. Howell, Leaflets West. Bot. 4: 16. 1944.) Leaf-blades entire to pinnately lobed; cymes fewer-flowered; corolla 3-5 mm. long, glabrous within, little longer than the calyx, the scales inconspicuous or obsolete; filaments glabrous. Dry slopes, Arid Transition and Upper Sonoran Zones; southeastern Oregon to Wyoming, Nevada, and Utah. Type locality: Green River, Wyoming.

2. *Miltitzia inyoensis* J. F. Macbride. Inyo *Miltitzia*. Fig. 4134.

Miltitzia inyoensis J. F. Macbride, Contr. Gray Herb. No. 49: 41. 1917.

Phacelia inyoensis J. T. Howell, Leaflets West. Bot. 4: 16. 1944.

Plants erect or the branches ascending, 0.3-1 dm. tall, densely short-hispid and finely glandular throughout. Leaf-blades oblong-oval, about 1 cm. long and up to 1 cm. broad, cuneate at base, with a slender petiole, entire to pinnately few-lobed; cymes few-flowered and lax, the pedicels 2-5 mm. long in fruit; calyx-lobes linear to linear-spatulate, 3-6 mm. long; corolla yellow, 3-3.5 mm. long, 2-3 mm. broad, about equaling the calyx, the lobes about 0.8 mm. long, oval; anthers orbicular; style 1 mm. long, the short branches divaricate; capsule 3-4 mm. long, ovoid; seeds about 6, oblong, brown, scarcely 1 mm. long.

Granite sand, Sonoran Zones; Owens Valley, California. Type locality: foothills west of Bishop, Inyo County. May-June.

3. *Miltitzia parviflora* (A. Gray) Brand. Small-flowered *Miltitzia*. Fig. 4135.

Emmenanthe parviflora A. Gray ex Newb. Pacif. R. Rep. 6: 84. pl. 15. 1857.

Miltitzia parviflora Brand, Pflanzenreich 4²⁴: 131. 1913.

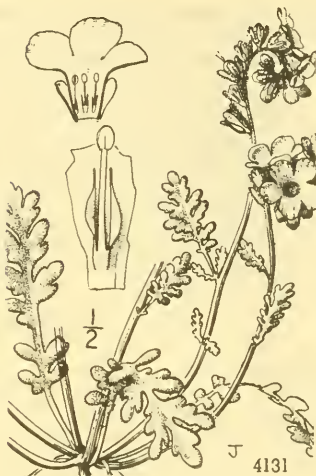
Phacelia inundata J. T. Howell, Leaflets West. Bot. 4: 15. 1944.

Plants diffuse, the branches 1-4 dm. long, prostrate-spreading or ascending from a basal rosette, short-hispid and glandular throughout. Leaf-blades oblong, 1-3 cm. long, 0.5-1.5 cm. broad, nearly entire to pinnate, with a slender petiole; cymes very numerous, much-branched, many-flowered, dense, the pedicels 1-2 mm. long in fruit; calyx-lobes linear to linear-spatulate, 3-4 mm. long; corolla yellow, about 4 mm. long, 3-4 mm. broad, about equaling the calyx, the lobes oval, about 2 mm. long; anthers broadly oval; style 1 mm. long, the short branches divaricate; capsule 5-7 mm. long; seeds 10-15, ovoid, brown, 1.5-2 mm. long.

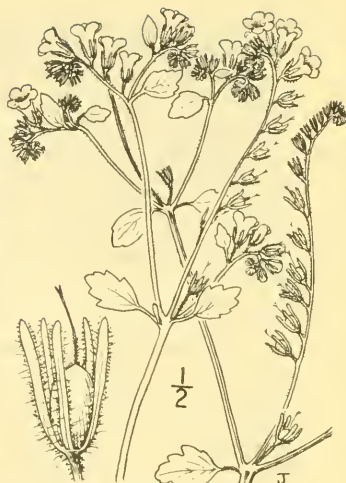
Sandy flats on the borders of alkaline lakes, Arid Transition and Upper Sonoran Zones; south central Oregon to northeastern California and adjacent Nevada. Type locality: Klamath Lake, Oregon. May-July.



4130



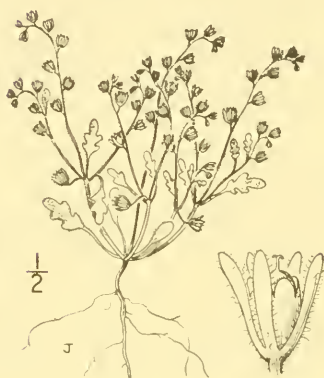
4131



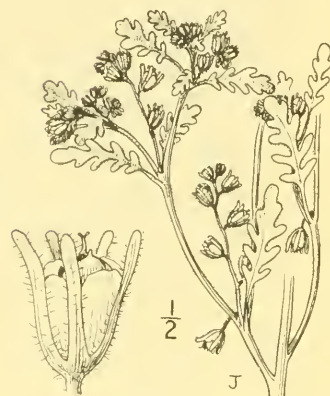
4132



4133



4134



4135



4136



4137

4130. *Phacelia brachyloba*
 4131. *Phacelia Fremontii*
 4132. *Phacelia gymnoclada*

4133. *Miltitzia lutea*
 4134. *Miltitzia inyoensis*
 4135. *Miltitzia parviflora*

4136. *Miltitzia pusilla*
 4137. *Emmenanthe penduliflora*

4. *Miltitzia pusilla* (A. Gray) Brand. Dwarf Miltitzia. Fig. 4136.

Emmenanthe pusilla A. Gray, Proc. Amer. Acad. 11: 87. 1876.

Miltitzia pusilla Brand, Pflanzenreich 4²⁵¹: 132. 1913.

Miltitzia pusilla var. *flagellaris* Brand, loc. cit.

Phacelia tetramera J. T. Howell, Leaflets West. Bot. 4: 16. 1944.

Plants diffuse, the branches 0.3–1.5 dm. long, prostrate-spreading from a basal rosette, short-hispid and glandular-viscid throughout to subglabrate. Leaf-blades oblong, 1–2 cm. long, 0.3–0.7 cm. broad, entire or few-toothed, cuneate at base with a long, slender petiole; cymes few and very lax, the few flowers remote, the pedicels 3–7 mm. long in fruit; calyx-lobes narrowly spatulate, 3–5 mm. long; corolla whitish, 1.5–2 mm. long, conspicuously shorter than the calyx, the lobes about 0.5 mm. long, oval; style about 0.3 mm. long, scarcely cleft; capsule about 3 mm. long, ovoid to globose; seeds about 10, ovoid, brown, 1 mm. long.

Dry, alkaline flats, Arid Transition and Upper Sonoran Zones; southeastern Oregon to eastern California and adjacent Nevada. Type locality: Steamboat Springs, Nevada. May–June.

7. *EMMENANTHE* Benth. Trans. Linn. Soc. 17: 281. 1835.

Erect, hirsute, glandular-viscid, scented annuals from slender taproots. Leaves alternate, short-petiolate or the upper sessile, pinnatifid. Flowers rather numerous in branched, lax, scorpioid terminal cymes, pendulous, long-pedicellate. Calyx divided nearly to the base, the lobes subequal. Corolla light yellow, withering-persistent and enclosing the capsule, campanulate, longer than the calyx, shallowly lobed. Stamens included, subequal and equally inserted on the base of the corolla-tube, the anthers oblong. Style included, shortly 2-cleft. Mature capsule unilocular, partially divided by the intrusion of the placentae, narrowly oblong, acute, flattened, loculicidally dehiscent. Ovules numerous, pendulous, on the two prominent, linear placentae. Seeds oval, flattened, strongly reticulate. [Name Greek, meaning to abide and flower.]

A single species of the southwestern United States and adjacent Mexico, *Emmenanthe penduliflora* Benth.

1. *Emmenanthe penduliflora* Benth. Whispering Bells. Fig. 4137.

Emmenanthe penduliflora Benth. Trans. Linn. Soc. 17: 281. 1835.

Plants simple to much-branched, 1.5–5 dm. tall. Leaf-blades oblong, 3–8 cm. long, 0.5–2 cm. broad, pinnatifid with oblong, often dentate lobes, decurrent at base into a very short, winged or clasping petiole; cymes numerous, the flowers on filiform pedicels, recurved and usually 1 cm. long or longer in fruit; calyx-lobes ovate-lanceolate, 6–10 mm. long; corolla 8–12 mm. long, 6–10 mm. broad, the lobes orbicular, 1–2 mm. long; style about 2 mm. long, the short lobes reflexed; capsule about 1 cm. long; seeds about 15, dark brown, 1.5–2.5 mm. long.

Rocky soil, particularly common on burns, Transition and Sonoran Zones; Coast Ranges of central California to Lower California, east to Arizona. Type locality: California. Collected by Douglas. April–June.

Emmenanthe penduliflora var. *rosea* Brand, Pflanzenreich 4²⁵¹: 134. 1913. Corolla light pink. California, Mount Hamilton Range to Mount Pinos. Type locality: Mount Pinos.

8. *DRAPERIA* Torr. ex A. Gray, Proc. Amer. Acad. 7: 401. 1868.

Low, diffuse, perennial herbs from the horizontal, rooting branches of the woody root crown. Leaves opposite, sessile or petiolate, the blades entire. Flowers in naked, terminal, branched cymes, nearly sessile. Calyx divided nearly to the base. Corolla pale violet, deciduous, tubular-funnelform, shallowly lobed, exceeding the calyx. Stamens included, borne on the base of the corolla-tube, unequal and unequally inserted, the anthers oval. Style included, filiform, 2-lobed at apex. Mature capsule bilocular, globose. Ovules a pair in each locule, pendulous. Seeds 1–4, dark brown, ovoid, angular, alveolate. [Named in honor of J. W. Draper, an American historian.]

A single species of California, *Draperia systyla* (A. Gray) Torr.

1. *Draperia systyla* (A. Gray) Torr. Draperia. Fig. 4138.

Nama systyla A. Gray, Proc. Amer. Acad. 6: 37. 1861.

Draperia systyla Torr. ex A. Gray, op. cit. 7: 401. 1868.

Draperia systyla var. *minor* Brand, Univ. Calif. Pub. Bot. 4: 214. 1912.

Stems few to numerous, 1.5–4 dm. tall, from the slender, woody branches of the caudex, softly hirsute throughout. Leaf-blades narrowly to broadly ovate, 2.5–5 cm. long, 1.5–3.5 cm. broad, entire, sessile or short-petiolate; cymes with 2 to several branches, the pedicels ascending in fruit, only 1–3 mm. long; calyx-lobes linear, 4–7 mm. long; corolla 10–14 mm. long, 5–8 mm. broad, pubescent on the outside, the lobes oval to orbicular, 1–3 mm. long; anthers less than 1 mm. long; capsule 1.5–3 mm. in diameter; seeds about 2 mm. long.

Dry, rocky soil in pine woods, Transition and Boreal Zones; western slope of the Sierra Nevada, northwest to Siskiyou and Trinity Counties, California. Type locality: Yosemite Valley. June–Aug.

9. **LEMMONIA** A. Gray, Proc. Amer. Acad. 12: 162. 1877.

Low, prostrate, matted, dichotomously branching, pubescent annuals from a slender taproot. Leaves alternate, entire, clustered in a basal rosette and at the ends of the branches. Flowers solitary in the upper axils and angles of the branches, and several in congested, non-scorpioid terminal cymes, sessile. Calyx divided nearly to the base, the lobes subequal. Corolla white, deciduous, campanulate, constricted at the point of stamen-attachment, shorter than the calyx. Stamens included, unequal, equally inserted toward the base of the corolla-tube and coherent by the lateral dilation of their bases; other appendages wanting. Style divided to the base. Mature capsule falsely bilocular by the intrusion and union of the narrow placentae, membranaceous, loculicidally dehiscent. Ovules 2-3 to each placenta, borne superposed, the placentae narrow. Seeds usually about 4, almost black, ovoid-oblong, irregularly corrugated. [Named in honor of J. G. Lemmon, an early Californian botanist.]

A monotypic genus of the southwestern United States and adjacent Mexico, *Lemmonia californica* A. Gray.

1. **Lemmonia californica** A. Gray. *Lemmonia*. Fig. 4139.

Lemmonia californica A. Gray, Proc. Amer. Acad. 12: 162. 1877.

Branches prostrate, 2-10 cm. long. Leaf-blades oblanceolate, 3-8 mm. long, 2-3 mm. broad, tapering gradually to the base, sericeous; calyx-lobes linear, 2.5-3 mm. long in flower, up to 5 mm. long in fruit, densely soft-hirsute; corolla about 2 mm. long and nearly as broad, shallowly lobed, the lobes oval, about 0.8 mm. long; stamens glabrous; style 0.5-0.8 mm. long; seeds about 1 mm. long.

Sandy places, Transition and Boreal Zones; hills and mountains on the northern and western borders of the Mojave Desert to northern Lower California; southern and northern Coast Ranges, California. Type locality: headwaters of the Mojave River. May-June.

10. **NAMA** L. Syst. Nat. ed. 10. 2: 950. 1759. Not Nama L. 1753.

Nomen conservandum.

Low, branching, often prostrate and matted, pubescent, annual herbs or somewhat woody perennials, from slender taproots. Leaves alternate, entire or rarely dentate, numerous on the stems. Flowers in reduced terminal, non-scorpioid cymes and/or solitary in the upper leaf-axils and angles of the branches, subsessile. Calyx divided nearly to the base, the lobes subequal, or divided only partially and the tubular base adherent to the inferior ovary. Corolla purple to white, deciduous, tubular to broadly funnelform, exceeding the calyx. Stamens included, borne on the corolla tube, unequal or unequally inserted, appendaged at base, the appendages with or without a free edge, usually minute or obsolete. Style included, divided to the base or only shallowly 2-lobed at apex. Mature capsule falsely bilocular by the intrusion of the placentae, linear-oblong to broadly ovoid, membranaceous and loculicidally dehiscent, or semi-cartilaginous and both septicidally and loculicidally dehiscent. Ovules numerous, borne on narrow, projecting placentae. Seeds usually numerous, brown, ovoid, usually reticulate and sometimes shallowly pitted. [Name Greek, meaning a spring.]

A genus of 40-50 species, principally of the southwestern United States and northern Mexico; a few species in southern South America and one in the Hawaiian Islands. Type species, *Nama jamaicense* L.

Calyx only partially divided, the tubular base adherent to the inferior ovary; calyx-lobes recurved and indurate in fruit.

Calyx divided nearly to the base, the ovary superior; calyx-lobes usually erect and not indurate.

Perennial, more or less woody, at least at base; flowers numerous in terminal cymes.

Leaves coarsely dentate; cymes naked, capitate.

Leaves entire; cymes leafy-bracted, not capitate.

Annual, herbaceous throughout; flowers solitary, or few in greatly reduced terminal cymes.

Style shallowly 2-lobed at apex.

Corolla tubular, 3-5 mm. long, 1-3 mm. broad.

Corolla broadly funnelform, 10-17 mm. long, 7-12 mm. broad.

Style divided to the base.

Corolla broadly funnelform, 8-15 mm. long, 6-12 mm. broad; calyx-lobes linear-lanceolate, 5-8 mm. long; style 2-5 mm. long.

Plants usually erect; seeds numerous, dark brown.

Plants usually prostrate, matted; seeds few (15-25), yellowish brown.

Corolla tubular to nearly salverform, 3-5 mm. long, 2-3 mm. broad; calyx-lobes linear to linear-ob lanceolate, 3-4 mm. long; style 1-1.5 mm. long.

Leaf-blades ovate, 2-5 mm. long; calyx densely hirsute.

Leaf-blades oblanceolate, 5-10 mm. long; calyx sparsely pubescent.

1. *N. Rothrockii*.

2. *N. Lobbii*.

3. *N. densum*.

4. *N. aretioides*.

6. *N. hispidum*.

7. *N. demissum*.

8. *N. pusillum*.

9. *N. depressum*.

1. **Nama Rothrockii** A. Gray. Rothrock's Nama. Fig. 4140.

Nama Rothrockii A. Gray, Bot. Calif. 1: 621. 1876.

Low, matted, leafy perennials from a slightly woody base, hirsute, hispid, and very glandular throughout, 1.5-3 dm. tall. Leaf-blades oblong to lanceolate, 2-5 cm. long, 0.5-1.5 cm. broad, coarsely dentate, hispid and glandular, venose beneath, tapering at base into a short petiole;

flowers numerous in congested, capitate, terminal cymes; calyx-lobes linear, 10–15 mm. long, bristly-hirsute; corolla lavender, funnelliform, 10–15 mm. long, 6–9 mm. broad, the lobes ovate, 2–3 mm. long; stamens unequal and unequally inserted, the anthers oval, about 1 mm. long; appendages glabrous on their free edge; style 8–10 mm. long, divided to the base; capsule ovoid, 4–5 mm. long, membranaceous, loculicidally dehiscent; seeds about 15, ovoid, angular, dark brown, about 1.5 mm. long, minutely reticulate.

Sandy soil in open pine woods, Boreal Zones; southern Sierra Nevada to the San Bernardino Mountains, California. Type locality: Monache Meadows, Tulare County, California. July–Aug.

2. *Nama Lobbii* A. Gray. Lobb's Nama. Fig. 4141.

Nama Lobbii A. Gray, Proc. Amer. Acad. 6: 37. 1862.

Low suffrutescent, leafy perennial, tomentose and glandular, 0.5–3 dm. tall. Leaf-blades linear-oblong to oblanceolate, 1–6.5 cm. broad, entire, conspicuously gray-tomentose beneath, tapering at base into a short petiole or sessile, those of the sterile shoots rather broad and nearly plane, of the fertile, narrower and revolute; flowers numerous in compact, leafy-bracted terminal cymes, subsessile; calyx-lobes linear-subulate, 3–7 mm. long; corolla purple, broadly funnelliform, 9–11 mm. long, 6–8 mm. broad, the lobes orbicular, 2–3 mm. long; stamens unequal and unequally inserted; appendages hirsute on their free edge; style about 3 mm. long, divided to the base; capsule globose-ovoid, about 3 mm. long, somewhat cartilaginous and both loculicidally and septically dehiscent; seeds 10–12, ovoid, angular, about 1.5 mm. long, dark brown, minutely reticulate.

Sandy or rocky soil in open pine woods, Boreal Zones; Cascade Mountains of southern Oregon to the Lake Tahoe region of California and adjacent Nevada. Type locality: California. June–Sept.

3. *Nama densum* Lemmon. Matted Nama. Fig. 4142.

Nama densum Lemmon, Bull. Torrey Club 16: 222. 1889.

Conanthus parviflorus Greenm. Erythea 7: 117. 1899.

Diffuse, matted, dichotomously branched, leafy annuals, the branches prostrate from a slender taproot, hirsute and more or less hispid throughout. Leaf-blades oblanceolate, 0.5–2 cm. long, 2–5 mm. broad, acute, entire, tapering at base into a short petiole; flowers solitary, sessile in the upper leaf-axils and angles of the branches; calyx-lobes linear-subulate, 4–5 mm. long; corolla lavender, tubular-funnelform, 3–5 mm. long, 1–3 mm. broad, the lobes oval, about 1 mm. long; stamens unequally inserted; appendages minute; style 0.5–1.5 mm. long, shallowly 2-lobed; capsule ovoid, 2–3 mm. long, loculicidally dehiscent; seeds about 15, dark brown, 0.5–0.7 mm. long, shallowly pitted and minutely reticulate.

Sandy soil in sagebrush and open pine woods, Arid Transition and Boreal Zones; Great Basin, from central Washington to the desert borders of eastern California; east to southern Idaho and Nevada. Type locality: near Edgewood, Siskiyou County, California. May–July.

4. *Nama aretioides* (Hook. & Arn.) Brand. Purple Nama. Fig. 4143.

Eutoca aretioides Hook. & Arn. Bot. Beechey 374. 1838.

Conanthus multiflorus Heller, Muhlenbergia 2: 238. 1906.

Nama aretioides Brand, Univ. Calif. Pub. Bot. 4: 224. 1912.

Diffuse, matted, dichotomously branched, leafy annuals, the branches prostrate from a slender taproot, hirsute throughout. Leaf-blades narrowly lanceolate, 0.5–2 cm. long, 1.5–3 mm. broad, acute, entire, tapering at base into a slender petiole; flowers solitary, subsessile in the upper leaf-axils and angles of the branches; calyx-lobes linear-subulate, 5–7 mm. long; corolla pale violet, broadly funnelliform, 10–17 mm. long, 7–12 mm. broad, the lobes oval, 2–4 mm. long; stamens unequally inserted; appendages obsolete; style 3–5 mm. long, shallowly 2-lobed; capsule ovoid, 2–3 mm. long, loculicidally dehiscent; seeds usually 15–25, ovoid, 0.5–1.5 mm. long; dark brown, shallowly pitted and minutely reticulate.

Sandy flats, Sonoran Zones; southeastern Oregon to the desert ranges of eastern California; east to Idaho and Nevada. Type locality: "Between Burnt and Malheur Rivers," Oregon. May–June.

5. *Nama stenocarpum* A. Gray. Mud Nama. Fig. 4144.

Nama stenocarpum A. Gray, Proc. Amer. Acad. 10: 331. 1875.

Nama humifusum Brand, Jahresb. Kgl. Gymnas. Sorau Beilage. 9. 1911.

Diffuse, leafy annuals, the branches prostrate or ascending from a slender taproot, 1–3 dm. long, hirsute throughout. Leaf-blades oblanceolate, 1.5–3.5 cm. long, 0.4–1 cm. broad, undulate, tapering at base into a short petiole or sessile to auriculate, especially above; flowers several at the nodes and in compact, leafy-bracted, terminal cymes; calyx-lobes linear-spatulate, 4–6 mm. long, accrescent, recurved, and indurate in fruit, the basal tubular portion of the calyx adherent to the inferior ovary; corolla funnelliform, 5–7 mm. long, 3–4 mm. broad, the lobes ovate, about 1 mm. long; stamens unequal but subequally inserted; style 1.5–2 mm. long, divided only about one-third; capsule linear-oblong, 5–6 mm. long, loculicidally dehiscent; seeds very numerous, irregularly ovoid, flattened, 0.2–0.3 mm. long, light brown, finely reticulate.

Muddy shores of lakes and on river banks, Sonoran Zones; southern California to Texas and northern Mexico. Type locality: Matamoras, Mexico. March–May.



4138. *Draperia systyla*
 4139. *Lemmonia californica*
 4140. *Nama Rothrockii*

4141. *Nama Lobbii*
 4142. *Nama densum*
 4143. *Nama aretioides*

4144. *Nama stenocarpum*
 4145. *Nama hispidum*
 4146. *Nama demissum*

6. *Nama hispídum* A. Gray. Hispid Nama. Fig. 4145.

Nama biflora var. *spatulatum* Torr. Pacif. R. Rep. 7: 17. 1856.

Nama hispídum A. Gray, Proc. Amer. Acad. 5: 339. 1861.

Nama hispídum var. *revolutum* Jepson, Man. Fl. Pl. Calif. 832. 1925.

Low, branched, leafy annuals, the branches basal, erect or ascending from a slender taproot, 1-3 dm. tall, hispid and more or less hirsute throughout. Leaf-blades linear-oblongate, 1-7 cm. long, 2-6 mm. broad, obtuse, entire, tapering to the base, revolute; flowers solitary, or several in small terminal cymes, subsessile; calyx-lobes linear-lanceolate, 5-8 mm. long; corolla bright purple, broadly funnelform, 8-15 mm. long, 7-8 mm. broad, the lobes oval, 2-3 mm. long; stamens unequally inserted; appendages minute; style 2-5 mm. long, cleft to the base; capsule linear-oblong, 4-7 mm. long; seeds numerous, ovoid, 0.5 mm. long, yellowish brown, reticulate.

Sandy soil, Sonoran Zones; deserts of southeastern California to western Texas; south to northern Mexico. Type locality: Texas. March-May.

7. *Nama demissum* A. Gray. Purple Mat. Fig. 4146.

Nama demissum A. Gray, Proc. Amer. Acad. 8: 283. 1870.

Nama demissum var. *Covillei* Brand, Pflanzenreich 4261: 159. 1913.

Nama demissum var. *deserti* Brand, loc. cit.

Diffuse annuals, leafy toward the ends of the branches, the branches basal, prostrate from a slender taproot, 0.2-1.5 dm. long, soft-hirsute throughout. Leaf-blades linear-oblong to oblanceolate, 1-3.5 cm. long, 1-5 mm. broad, obtuse, entire, tapering to the base; flowers solitary, or several in small terminal cymes, subsessile; calyx-lobes linear-lanceolate, 5-8 mm. long; corolla purple, broadly funnelform, 8-15 mm. long, 6-12 mm. broad, the lobes oval, 2-3 mm. long; stamens subequally inserted; appendages minute; style 3-5 mm. long, divided to the base; capsule linear-oblong, 3-4 mm. long; seeds usually 10-15, ovoid, 0.5 mm. long, dark brown, shallowly pitted and minutely reticulate.

Sandy soil, Sonoran Zones; desert regions of California, to Utah, Arizona, and Lower California. Type locality: Nevada. March-June.

8. *Nama pusillum* Lemmon. Small-leaved Nama. Fig. 4147.

Nama pusillum Lemmon ex A. Gray, Proc. Amer. Acad. 20: 305. 1885.

Diffuse, matted, dichotomously branched, leafy annuals, the branches prostrate or ascending from a slender taproot, densely grayish-hirsute throughout. Leaf-blades ovate, 2-5 mm. long, 1.5-3 mm. broad, obtuse, entire, tapering at base into a slender petiole; flowers solitary, subsessile in the upper leaf-axils and angles of the branches; calyx-lobes linear to linear-oblongate, 3-4 mm. long, 2-3 mm. broad, the lobes oval, about 0.5 mm. long; stamens unequally inserted; appendages filiform; style 1-1.5 mm. long, divided to the base; capsule ovoid, 2.5-3 mm. long; seeds usually 20-30, ovoid, angular, about 0.5 mm. long, reticulate.

Sandy soil, Sonoran Zones; desert region of southeastern California. Type locality: Calico, Mojave Desert. April-May.

9. *Nama depréssum* Lemmon. Narrow-leaved Nama. Fig. 4148.

Nama depressum Lemmon ex A. Gray, Proc. Amer. Acad. 20: 304. 1885.

Diffuse, matted, dichotomously branched, leafy annuals, the branches prostrate or ascending from a slender taproot, softly appressed-pubescent throughout. Leaf-blades oblanceolate, 0.5-1 cm. long, 1-3 mm. broad, acute, entire, tapering at base into a short petiole; flowers solitary, subsessile in the upper leaf-axils and angles of the branches; calyx-lobes linear to linear-oblongate, 3-4 mm. long, sparsely soft-pubescent; corolla white, tubular, about 4 mm. long, 2 mm. broad, the lobes oval, 0.5 mm. long; stamens unequally inserted; appendages minute; style 1-1.5 mm. long, divided to the base; capsule oblong-ovoid, 2.5-3 mm. long; seeds usually 15-25, ovoid, 0.5 mm. long, dark brown, shallowly pitted and minutely reticulate.

Sandy soil, Sonoran Zones; Mojave Desert, California. Type locality: Calico, San Bernardino County. April-May.

11. *TURRÍCULA* J. F. Macbride, Contr. Gray Herb. No. 49: 42. 1917.

Stout, erect, glandular and ill-scented perennial herb, woody and branched at base. Leaves alternate, thin, toothed or entire, sessile. Flowers numerous in a terminal, thyrsoid panicle of scorpioid, subsessile cymes. Calyx divided nearly to the base, the lobes subequal. Corolla purple, deciduous, funnelform, longer than the calyx, shallowly lobed. Stamens unequal, included, inserted on the base of the corolla-tube, the filaments adnate to the corolla-tube; appendages obsolete. Style divided to the base. Mature capsule membranaceous, falsely bilocular by the intrusion and union of the narrow placentae, both loculicidally and septicidally dehiscent into 4 valves. Ovules 6-8 in each locule. Seeds 6-10, oblong-ovoid, black, longitudinally striate with fine ridges and minutely transversely reticulate. [Name Latin, meaning little tower.]

A monotypic genus of the southwestern United States and Lower California, sole species, *Nama Parryi* A. Gray. It appears to combine the characters of *Eriodictyon* and *Nama*.

1. *Turricula Párryi* (A. Gray) J. F. Macbride. Sticky Nama or Poodle-dog Bush. Fig. 4149.

Nama Parryi A. Gray, Bot. Calif. 1: 621. 1876.

Eriodictyon Parryi Greene, Pittonia 2: 22. 1889.

Turricula Parryi J. F. Macbride, Contr. Gray Herb. No. 49: 42. 1917.

Plants viscid-pubescent throughout, 8–18 dm. tall. Leaf-blades lanceolate, usually 5–30 cm. long, 1–3 cm. broad, acuminate, tapering gradually into the narrow, sessile base; cymes glandular-hirsute, the inflorescence 1–3 dm. long, compact in flower, rather open in fruit; calyx-lobes linear-subulate, 3–4 mm. long, densely glandular-hirsute; corolla 10–20 mm. long, 5–15 mm. broad, the lobes orbicular, 2–5 mm. long; style about 5 mm. long; capsule ovoid, about 3 mm. long; seeds 1–1.5 mm. long.

Dry, brushy slopes, Sonoran and Transition Zones; southern Sierra Nevada and Tehachapi ranges and the mountains of southwestern California to northern Lower California. Type locality: "On the Mohave slope of the San Bernardino Mountains." June–Aug.

12. *ERIODICTYON* Benth. Bot. Sulph. 35. 1844.

Stout, erect, branched shrubs, evergreen, glabrous and glutinous to tomentose, with shredding bark. Leaves alternate, thick, toothed or entire, petiolate or sessile. Flowers numerous in terminal, branched, scorpioid, open or subcapitate cymes, pedicellate to subsessile. Calyx divided nearly to the base, the lobes subequal. Corolla violet or purple to white, deciduous, broadly funnelform to tubular-urceolate, usually longer than the calyx, shallowly lobed. Stamens included, equal or unequal, equally inserted on the base of the corolla-tube, the filaments often adnate to the tube; appendages obsolete. Style divided to the base. Mature capsule cartilaginous, falsely bilocular by the intrusion and union of the narrow placentae, both loculicidally and septicidally dehiscent into 4 nutlet-like valves. Ovules 2–4 in each locule. Seeds usually 2–6, ovoid, angular or somewhat flattened, dark brown or black, longitudinally striate with fine ridges. [Name Greek, meaning wool and net, referring to the appearance of the leaves.]

A genus of about 8 species, of the southwestern United States and adjacent Mexico. Type species, *Eriodictyon crassifolium* Benth.

Leaves narrowly linear, subsessile; inflorescence capitate-clustered, glabrate.

1. *E. capitatum*.

Leaves linear-lanceolate to oval, distinctly petiolate; inflorescence open, or if subcompact, either tomentose or glandular-hirsute.

Leaves glabrous and glutinous above (including *E. crassifolium* var. *denudatum*).

Leaves densely tomentose beneath, obscuring the lateral veins.

4. *E. lanatum*.

Leaves thinly tomentulose and strongly venose beneath.

Calyx-lobes sparsely hispidulous-ciliate to glabrous; corolla tubular-funnelform, 8–15 mm. long, 4–10 mm. broad.

2. *E. californicum*.

Calyx-lobes densely hirsute; corolla broadly funnelform, 5–8 mm. long and broad.

3. *E. trichocalyx*.

Leaves tomentose above, not glutinous.

Corolla broadly funnelform, 8–15 mm. long, 4–8 mm. broad; calyx-lobes nonglandular; style 4–5 mm. long.

5. *E. crassifolium*.

Corolla tubular-urceolate, 3–5 mm. long, 2–3 mm. broad; calyx-lobes glandular; style 2–3 mm. long.

6. *E. tomentosum*.

1. *Eriodictyon capitatum* Eastw. Lompoc Yerba Santa. Fig. 4150.

Eriodictyon capitatum Eastw. Leaflets West. Bot. 1: 40. 1933.

Plants 6–18 dm. tall, the branches glabrous and glutinous. Leaf-blades linear, 2–7 cm. long, 2–5 mm. broad, entire, glabrous and glutinous above, densely white-tomentose beneath, strongly revolute, tapering into a sessile base; cymes glabrous, capitate-clustered; calyx-lobes linear-subulate, 8–10 mm. long, densely hirsute; corolla lavender, tubular-funnelform, 8–15 mm. long, 6–10 mm. broad, the lobes orbicular, 2–3 mm. long; style 3–4 mm. long.

Chaparral, Upper Sonoran and Transition Zones; coastal mesa region of Santa Barbara County, California. Type locality: north of Lompoc. May–July.

Eriodictyon angustifolium Nutt. Journ. Acad. Phila. II. 1: 181. 1848. Plants 6–20 dm. tall, the branches glabrous and glutinous; leaf-blades linear to narrowly linear-lanceolate, 4–8 cm. long, 2–5 mm. broad, entire or inconspicuously dentate, revolute, glabrous and glutinous above, canescent and venose beneath, subsessile; cymes glutinous and sparsely pubescent, open in fruit; calyx-lobes linear, 3 mm. long, nearly glabrous to somewhat hirsute; corolla white, narrowly campanulate, 5–6 mm. long, barely exceeding the calyx. New York Mountains, eastern San Bernardino County, California; east to Nevada, Utah, and Arizona, and south to Lower California. Type locality: "Sierra of Upper California."

2. *Eriodictyon californicum* (Hook. & Arn.) Torr. California Yerba Santa. Fig. 4151.

Wigandia californica Hook. & Arn. Bot. Beechey 364. 1838.

Eriodictyon glutinosum Benth. Bot. Sulph. 36. 1844.

Eriodictyon californicum Torr. Bot. Mex. Bound. 148. 1859.

Plants 6–24 dm. tall, the branches sparsely hispidulous to glabrous, glutinous. Leaf-blades linear-lanceolate to ovate-lanceolate, 5–15 cm. long, 1–5 cm. broad, undulate to serrate, or entire, glabrous and glutinous above, thinly tomentulose and strongly venose beneath, tapering into a short petiole; cymes usually glabrate, open in fruit; calyx-lobes linear-lanceolate, 2–3 mm.

long, sparsely hispidulous-ciliate to glabrate, glutinous; corolla lavender to white, tubular-funnelform, 8–15 mm. long, 4–10 mm. broad, the lobes orbicular, 1.5–3 mm. long; style 4–5 mm. long; capsule 2–3 mm. long, white-gummy; seeds nearly black, 1–1.5 mm. long.

Chaparral, especially in burns, Upper Sonoran and Transition Zones; southern Oregon to the southern Sierra Nevada and Southern Coast Ranges of California. Type locality: "California." May–July.

3. *Eriodictyon trichocalyx* Heller. Hairy Yerba Santa. Fig. 4152.

Eriodictyon angustifolium var. *pubens* A. Gray, Proc. Amer. Acad. 17: 224. 1882.

Eriodictyon trichocalyx Heller, Muhlenbergia 1: 108. 1904.

Eriodictyon californicum subsp. *australe* Brand, Pflanzenreich 4²⁵¹: 141. 1913, in part.

Plants 5–15 dm. tall, the branches sparsely hispidulous to glabrate, glutinous. Leaf-blades linear-lanceolate to ovate-lanceolate, 5–10 cm. long, 1–3 cm. broad, serrate, sometimes revolute, glabrous and glutinous above, thinly tomentulose and strongly venose beneath, tapering into a short petiole; cymes hirsutulous, open in fruit; calyx-lobes linear-lanceolate, 3–4 mm. long, densely hirsute, nonglandular; corolla pale purplish or white, broadly funnelform, 5–8 mm. long and broad, the lobes orbicular, about 2 mm. long; style 3–4 mm. long; capsule 2–3 mm. long, densely hispidulous; seeds dark brown, 1–1.5 mm. long.

Chaparral, Upper Sonoran Zones; Southern Coast Ranges to the San Gabriel and San Bernardino Mountains, California. Type locality: Seven Oaks Camp, San Bernardino Mountains, California. May–August.

4. *Eriodictyon lanatum* (Brand) Abrams. San Diego Yerba Santa. Fig. 4153.

Eriodictyon californicum var. *lanatum* Brand, Pflanzenreich 4²⁵¹: 142. 1913.

Eriodictyon lanatum Abrams in Abrams & Smiley, Bot. Gaz. 60: 126. 1915.

Plants 5–15 dm. tall, the branches permanently tomentose. Leaf-blades linear-lanceolate to ovate-lanceolate, 4–9 cm. long, 0.5–2 cm. broad, undulate to serrate, glabrate and glutinous above, densely white-tomentose beneath, slightly revolute, tapering into a short petiole; cymes tomentose, open in fruit; calyx-lobes linear-lanceolate, 2–3 mm. long, densely hirsute and somewhat glutinous; corolla purple to white, funnelform, 6–10 mm. long, 3–5 mm. broad, the lobes ovate, about 2 mm. long; style about 3 mm. long; capsule about 2.5 mm. long, hirsute; seeds 1–1.5 mm. long.

Chaparral, Sonoran Zones; mountains of Riverside and San Diego Counties, California, to northern Lower California. Type locality: between Campo and Jacumba, San Diego County, California. April–June.

5. *Eriodictyon crassifolium* Benth. Thick-leaved Yerba Santa. Fig. 4154.

Eriodictyon crassifolium Benth. Bot. Sulph. 35. 1844.

Plants 9–40 dm. tall, the branches permanently tomentose. Leaf-blades broadly lanceolate to oval, 5–15 cm. long, 1.5–5 cm. broad, crenate to coarsely dentate, densely tomentose on both surfaces, strongly venose beneath, plane, tapering into a short petiole; cymes tomentose, open in fruit; calyx-lobes linear-lanceolate, 3–5 mm. long, densely soft-hirsute, nonglandular; corolla lavender, broadly funnelform, 8–15 mm. long, 4–8 mm. broad, the lobes orbicular, 2–3 mm. long; style 4–5 mm. long; capsule 2–3 mm. long, densely hirsute; seeds about 1 mm. long.

Chaparral, Sonoran and Transition Zones; mountains of southern California from the Tehachapi Range to the San Diego region. Type locality: San Diego. April–June.

Eriodictyon crassifolium var. *nigrescens* Brand, Pflanzenreich 4²⁵¹: 140. 1913. Leaves rather narrow, less densely tomentose and dull grayish green above; corolla usually about 6 mm. long, densely hairy externally. Mountains of Ventura, Kern, and Los Angeles Counties. Type locality: Acton, Los Angeles County. This variety and the next appear to connect *E. crassifolium* with *E. trichocalyx*.

Eriodictyon crassifolium var. *denudatum* Abrams in Abrams & Smiley, Bot. Gaz. 60: 129. 1915. Leaves greenish and glabrate, or even somewhat glutinous above, tomentulose and venose beneath. Santa Barbara and Ventura Counties, California. Type locality: Red Reef Canyon, Topatopa Mountains, Ventura County.

6. *Eriodictyon tomentosum* Benth. Woolly Yerba Santa. Fig. 4155.

Eriodictyon tomentosum Benth. Bot. Sulph. 36. 1844.

Eriodictyon niveum Eastw. Proc. Calif. Acad. III. 1: 130. 1898.

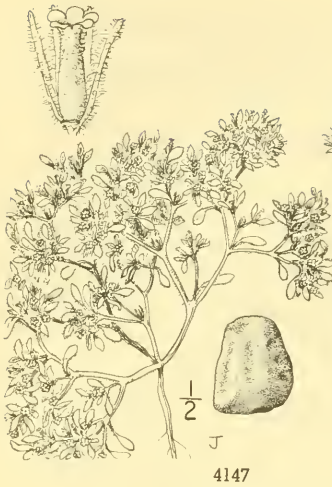
Plants 5–18 dm. tall, the branches tomentose. Leaf-blades oblanceolate to oval, 4–6 cm. long, 1–3 cm. broad, entire to dentate, densely tomentose on both surfaces, with a very close indument, venose beneath, plane, tapering into a short petiole; cymes tomentose, rather compact even in fruit; calyx-lobes linear-subulate, 2–3 mm. long, hirsute and glandular; corolla lavender to white, tubular-urceolate, 3–5 mm. long, 2–3 mm. broad, the lobes ovate, about 0.5 mm. long; style about 2 mm. long; capsule 2 mm. long, hirsute; seeds 1–1.5 mm. long.

Chaparral, Upper Sonoran and Transition Zones; Coast Ranges of California, from Monterey County to northern Santa Barbara County. Type locality: California. Collected by Douglas. June–July.

Eriodictyon Tráskiae Eastw. Proc. Calif. Acad. III. 1: 131. 1898. Calyx-lobes densely glandular-hirsute, 4–5 mm. long; corolla 4–7 mm. long, the lobes about 1 mm. long. Coast Ranges of California, from Monterey County to Santa Barbara County, and on Santa Catalina Island. Type locality: Santa Catalina Island.

13. *HESPEROCHIRON* S. Wats. Bot. King. Expl. 281. *pl.* 30. 1871.

Dwarf, acaulescent, perennial herbs from a short, vertical, fusiform root (rootstock?). Leaves forming a rosette at the surface of the ground, petiolate, spreading or ascending. Flowers arising singly in the axils of the leaves, borne on long, slender, erect or spread-



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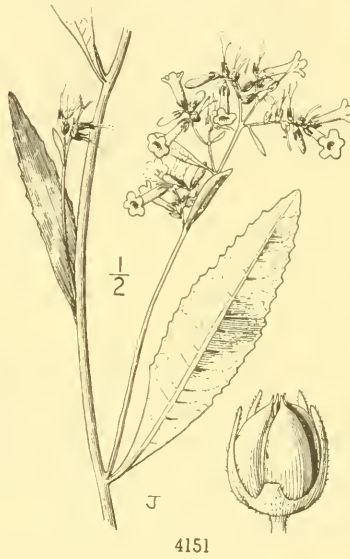
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4147. *Nama pusillum*
 4148. *Nama depressum*
 4149. *Turricula Parryi*

4150. *Eriodictyon capitatum*
 4151. *Eriodictyon californicum*
 4152. *Eriodictyon trichocalyx*

4153. *Eriodictyon lanatum*
 4154. *Eriodictyon crassifolium*
 4155. *Eriodictyon tomentosum*

ing peduncles. Calyx divided nearly to the base, the lobes often unequal. Corolla white or bluish, deciduous, funnelform or rotate, often irregularly divided, exceeding the calyx. Stamens included, borne on the corolla-tube, often unequal, the filaments dilated at base, the anthers somewhat versatile. Style included, shortly 2-cleft at apex. Mature capsule unilocular, ovoid to ovoid-oblong. Ovules borne on narrow placentae projecting inwards from the sutures. Seeds numerous, dark brown, ovoid, angular, alveolate. [Name Greek, meaning western and Chiron, one of the centaurs skilled in medicine.]

A genus of 2 species of western North America. Type species, *Ourisia californica* Benth.

Corolla pelviform to rotate, densely long-hairy within.

1. *H. pumilus*.

Corolla funnelform to salverform, glabrate or only short-hairy within.

2. *H. californicus*.

1. *Hesperochiron pumilus* (Griseb.) Porter. Dwarf Hesperochiron. Fig. 4156.

Villarsia pumila Griseb. ex Hook. Fl. Bor. Amer. 2: 70. pl. 157. 1838.

Hesperochiron pumilus Porter, Hayden Geol. Rep. 768. 1872.

Hesperochiron ciliatus Greene, Pittonia 1: 282. 1889.

Capnoea fulcrata Greene, Pittonia 5: 51. 1902.

Capnoea hirtella Greene, op. cit. 51.

Capnoea nervosa Greene, op. cit. 51.

Capnoea campanulata Greene, op. cit. 52.

Capnoea villosula Greene, op. cit. 52.

Hesperochiron pumilus var. *vestitus* Brand, Univ. Calif. Pub. Bot. 4: 227. 1912.

Plants 2–14 cm. high, sparsely short-villous, especially on the calyx-lobes, to glabrate. Leaf-blades linear-oblong to oblanceolate or occasionally oval, 1.5–5.5 cm. long, 0.5–1.5 cm. broad, tapering into a slender petiole, entire; peduncles usually solitary or few, usually 2–5 (1–10) cm. long, spreading or erect; calyx-lobes linear-oblong to ovate, often unequal, 3–9 mm. long, corolla pelviform to rotate, 0.5–1.5 cm. long, 1–3 cm. broad, densely long-hairy within, the lobes oblong-oval to orbicular, 3–10 mm. long; anthers oblong-oval, 1–2 mm. long; capsule ovoid, 5–9 mm. long; seeds 1–1.5 mm. long.

Wet and sometimes saline soil, Arid Transition and Boreal Zones; eastern Washington and Oregon to northern California, occasional in the Sierra Nevada; east to Idaho, Nevada, and Arizona. Type locality: "Vallies of the Rocky Mountains, between Kettle Falls and Spokane." April–June.

2. *Hesperochiron californicus* (Benth.) S. Wats. California Hesperochiron. Fig. 4157.

Ourisia californica Benth. Pl. Hartw. 327. 1849.

Hesperochiron californicus S. Wats. Bot. King Expl. 281. pl. 30. 1871.

Hesperochiron latifolius Kell. Proc. Calif. Acad. 5: 44. 1873.

Capnoea Watsoniana Greene, Pittonia 5: 44. 1902.

Capnoea strigosa Greene, op. cit. 45.

Capnoea leporina Greene, op. cit. 45.

Capnoea lasiantha Greene, op. cit. 47.

Capnoea macilenta Greene, op. cit. 48.

Capnoea incana Greene, op. cit. 49.

Hesperochiron californicus var. *Benthamianus* Brand, Univ. Calif. Pub. Bot. 4: 226. 1912.

Plants 2–10 cm. high, more or less short-villous throughout, at least toward the margins of the leaves and calyx-lobes. Leaf-blades narrowly oblong to oval, 1–5 cm. long, 0.5–2 cm. broad, tapering into a slender petiole, entire or inconspicuously repand; peduncles usually numerous, usually 2–4 (1–10) cm. long, spreading; calyx-lobes linear-oblong to ovate, often unequal, 2–8 mm. long; corolla sometimes irregular, funnelform to narrowly campanulate, often somewhat salverform, 1–2.5 cm. long, 1–2 cm. broad, sparsely short-villous to glabrate within, the lobes oblong to broadly oval, 2–8 mm. long; anthers oval, up to 1 mm. long; capsule ovoid or ovoid-oblong, 5–10 mm. long; seeds about 2 mm. long.

Wet and often alkaline or saline soil, Arid Transition and Boreal Zones; eastern Washington and Oregon through the Sierra Nevada to Lower California; east to Montana and Utah. Type locality: "in montibus Sacramento." April–June.

14. *TRICÁRDIA* Torr. ex S. Wats. Bot. King Expl. 258. 1871.

Low, perennial herbs from a stout taproot. Leaves chiefly in a basal rosette, petiolate, the cauline alternate, sessile or nearly so, all entire. Flowers rather few in loose, raceme-like, terminal cymes, pedicellate. Calyx divided nearly to the base, the lobes very unequal: the 3 outer, cordate, becoming conspicuously enlarged, venose, and scarious in fruit; the 2 inner, linear. Corolla purplish, deciduous, broadly campanulate but slightly narrowed at the throat, shallowly lobed, mostly shorter than the calyx. Stamens included, unequal but equally inserted on the lower part of the corolla-tube; appendages linear, free from the stamens. Style included, 2-cleft. Mature capsule unilocular, oblong, acute, the walls scarious in fruit. Ovules about 4 to each of the two linear placentae, pendulous. Seeds 4–8, oblong, dark brown, minutely alveolate.

A single species of the desert region of the southwestern United States, *Tricardia Watsonii* Torr. [Name Greek, meaning three and heart, referring to the outer calyx-lobes.]



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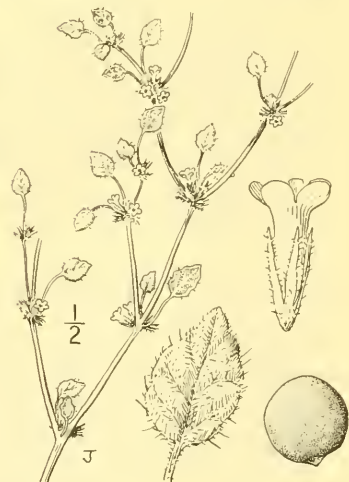
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4156. *Hesperochiron pumilus*4157. *Hesperochiron californicum*4158. *Tricardia Watsonii*4159. *Romanzoffia Suksdorfii*4160. *Romanzoffia Tracyi*4161. *Romanzoffia sitchensis*4162. *Coldenia canescens*4163. *Coldenia plicata*4164. *Coldenia Palmeri*

1. *Tricardia Watsonii* Torr. *Tricardia* or Three Hearts. Fig. 4158.

Tricardia Watsonii Torr. ex S. Wats. Bot. King Expl. 258. pl. 24. 1871.

Stems few to several from the base, 1-3 dm. tall, somewhat silky-villous throughout, but becoming glabrate. Leaf-blades lanceolate to ovate-lanceolate, 3-5 cm. long, 1-2.5 cm. broad, cuneate at base into a slender petiole, the cauline leaves reduced and usually sessile, all entire or obscurely crenate; cymes usually simple, the pedicels recurved in fruit, 2-5 mm. long; calyx-lobes 5-6 mm. long in flower, 15-25 mm. long in fruit; corolla about 5 mm. long, 6-8 mm. broad, the lobes oval to orbicular, 2-3 mm. long; capsule 7-9 mm. long; seeds 3-4 mm. long.

Dry, rocky canyons of the desert regions, Upper Sonoran Zone; Mojave and Colorado Deserts, California; east to southern Nevada and Utah. Type locality: "Truckee Pass," Nevada. April-July.

15. *ROMANZÓFFIA* Cham. ex Nees, Hor. Phys. Ber. 71. 1820.

Low, perennial herbs from a bulbous base formed by the dilated and imbricated leaf-sheaths, or from tomentose tubers. Leaves chiefly basal, long-petiolate, the blades reniform-orbicular to obovate, crenately toothed or lobed. Flowers in one to many raceme-like terminal cymes, pedicellate. Calyx divided nearly to the base. Corolla white, deciduous, campanulate to campanulate-funnelform, divided about one-third, exceeding the calyx. Stamens included, borne on the corolla-tube, subequal, the anthers sagittate. Style included, simple, the stigma capitate or obscurely bilobed. Mature capsule completely or partially bilocular by the union of the placentae, oblong to ovoid. Ovules borne on narrow placentae projecting from the sutures. Seeds numerous, ovoid, angular, brown, alveolate. [Named in honor of Count Nikolai von Romanzoff, promoter of Kotzebue's voyage to California.]

A western North American genus of 4 species, extending from the Aleutian Islands and Alaska to the northern Rocky Mountains and California. Type species, *Romanzoffia unalaschensis* Cham.

Plants bearing tomentose tubers at base.

Plants slender, glabrate, the inflorescence conspicuously exceeding the foliage; corolla campanulate-funnelform, the tube longer than the calyx.

1. *R. Suksdorfii*.

Plants low and very succulent, villous, the inflorescence little longer than the foliage; corolla campanulate, the tube shorter than the calyx.

2. *R. Tracyi*.

Plants without tubers, but the petioles conspicuously dilated and overlapping to form a bulbous base.

3. *R. sitchensis*.

1. *Romanzoffia Suksdorfii* Greene. Suksdorf's *Romanzoffia*. Fig. 4159.

Romanzoffia Suksdorfii Greene, Pittonia 5: 38. 1902.

Romanzoffia californica Greene, op. cit. 39.

Romanzoffia mendocina Greene, op. cit. 40.

Romanzoffia spargulina Greene, op. cit. 41.

Slender, rather widely branched, 1-3 dm. tall, from a cluster of tomentose, ovoid tubers, similar but smaller tubers often occurring in the inflorescence; herbage sparsely villous, especially below, to glabrate. Leaf-blades round-reniform, 1.5-4.5 cm. in diameter, crenately toothed or lobed, the petioles 2.5-11 cm. long, scarcely dilated at base; cymes few to numerous, the pedicels slender, ascending or diverging at right angles, usually 1-3 cm. long in fruit; calyx-lobes linear-lanceolate, mostly acute, 2-3 mm. long; corolla white, with a bright yellow band below the throat, campanulate-funnelform, 5-12 mm. long, the anthers oblong, 1-1.5 mm. long; style 4-7 mm. long; capsule oblong, about 1 cm. long; seeds about 2 mm. long.

Moist rocks about waterfalls, and other moist, shaded places, Humid Transition Zone; western Washington and Oregon to the Coast Ranges of central California. Type locality: Mitchell Point, Columbia River Gorge, Oregon. March-May.

2. *Romanzoffia Tracyi* Jepson. Tracy's *Romanzoffia*. Fig. 4160.

Romanzoffia Tracyi Jepson, Fl. Calif. 3: 296. 1943.

Low, forming rounded tufts, 0.5-1 dm. tall, from a cluster of tomentose, ovoid tubers; herbage conspicuously villous, especially on the stems and petioles, the leaf-blades nearly glabrous. Leaf-blades obovate to reniform, 1-3.5 cm. in diameter, crenately dentate, the petioles 1-8 cm. long, dilated at base; cymes few, the pedicels stout, ascending or diverging, 2-6 mm. long in fruit; calyx-lobes lanceolate, acute, 3-5 mm. long, 1-1.5 mm. broad; corolla white, with a pale yellow band below the throat, campanulate, 7-8 mm. long, the lobes spreading, oval, 2-3 mm. long; stamens 4-5 mm. long, the anthers 1 mm. long; style 2-3 mm. long; capsule ovoid, 0.5 cm. long; seeds about 1.5 mm. long.

Moist places on rocky ocean bluffs, Humid Transition Zone; at widely separated stations on the coast of Washington and Oregon to Trinidad Head, California, the type locality. March-April.

3. *Romanzoffia sitchensis* Bong. Sitka *Romanzoffia*. Fig. 4161.

Romanzoffia sitchensis Bong. Mém. Acad. St. Pétersb. VI. 2: 156. 1833.

Romanzoffia Leibergii Greene, Pittonia 5: 38. 1902.

Slender, simple or few-branched, 0.3-2.5 dm. tall, without tubers; herbage slightly villous, especially below, or glabrate, the dilated leaf-sheaths often arachnoid-ciliate. Leaf-blades round-reniform, 1-2.5 cm. in diameter, crenately lobed or toothed, the petioles 1-6 cm. long, con-

spicuously dilated and overlapping to form a bulbous base to the stem; cymes few, the pedicels usually ascending, commonly 1-3 cm. long in fruit; calyx-lobes oblong, mostly obtuse, 2-3 mm. long; corolla campanulate and more or less funnelform, 6-9 mm. long, the lobes oval, 2-3 mm. long; anthers oblong, 1 mm. or less long; capsule oblong-ovoid, 4-7 mm. long; seeds 1-1.5 mm. long.

Wet rocks, Boreal Zones; mountains of Washington, Oregon, and northern California, north to Alaska and the Aleutian Islands and east to Alberta and Montana. Type locality: Sitka, Alaska. June-Sept.

Family 132. BORAGINACEAE.*

BORAGE FAMILY.

Herbs, shrubs, or some tropical species trees. Leaves simple, alternate, or rarely opposite or whorled, commonly entire and pubescent, hispid or setose. Flowers perfect and usually regular, in one-sided scorpioid spikes, racemes, cymes or scattered. Calyx commonly 5-lobed or 5-parted, usually persistent, the lobes valvate. Corolla sympetalous, regular or rarely more or less irregular, 5-lobed, sometimes crested or appendaged in the throat. Stamens as many as corolla-lobes and alternate with them, inserted on the tube or throat of the corolla and usually included. Ovary superior, of two 2-ovuled carpels, entire or the carpels commonly deeply 2-lobed, making it appear as of four 1-ovuled carpels; style simple, entire or 2-cleft; ovules anatropous or amphitropous. Fruit mostly of four 1-seeded nutlets or rarely of two 2-seeded carpels. Endosperm none; embryo straight or curved.

A family of about 95 genera and 1,800 species, of world-wide distribution, but with one of the principal centers of distribution in southwestern United States.

Style deeply 2-cleft or 2-parted, each branch with a capitate stigma. (*Ehretioideae*.)

1. *Coldenia*.

Style entire, with a simple or obscurely lobed stigma.

Ovary undivided, shallowly lobed, the style borne on its summit; stigma annular-peltate. (*Heliotropioideae*.)

Fruit 2-lobed, each lobe splitting into 2 nutlets; stigma capped by a tuft of bristles; annuals, with solitary axillary flowers.

2. *Euploca*.

Fruit not lobed, splitting into 4 nutlets; stigma discoid, naked; flowers in scorpioid spikes; perennials.

3. *Heliotropium*.

Ovary 4-parted; style borne on the gynobase and arising between the lobes. (*Boraginoideae*.)

Calyx not armed with prickles and not becoming bur-like in fruit.

Nutlets widely spreading in fruit, armed with barbed or hooked prickles. (*Cynoglosseae*.)

Nutlets flat, armed on the margins with hooked bristles; slender annuals; corolla white.

4. *Pectocarya*.

Nutlets subglobose, armed all over with barbed prickles; perennials; corolla usually blue.

5. *Cynoglossum*.

Nutlets erect, not armed with prickles, except in *Lappula* and *Hackelia*, or minutely so in some species of *Allocarya*.

Attachment of nutlet surrounded by a tumid annular rim, strongly convex and leaving a pit upon the flat or low-convex receptacle. (*Anchuseae*.)

Stamens appendaged dorsally, closely crowded around the style; corolla rotate.

6. *Borago*.

Stamens unappendaged, included within the tubular corolla.

Corolla tubular-campanulate, throat campanulate-dilated, lobes short, erect or recurved at apex.

7. *Symphytum*.

Corolla funnelform or salverform, lobes usually elongated and spreading.

Corolla-tube bent near the middle, limb slightly irregular and oblique.

8. *Lycopsis*.

Corolla-tube straight, limb regular and not oblique.

9. *Anchusa*.

Attachment of nutlet not surrounded by a rim and not leaving a pit on the receptacle.

Receptacle flat or merely convex; nutlets attached by the base. (*Lithospermeae*.)

Flowers blue or white.

Corolla salverform, the lobes rounded and spreading.

10. *Myosotis*.

Corolla tubular or funnelform, the lobes erect or nearly so.

11. *Mertensia*.

Flowers yellow, bracteate; corolla-tube cylindrical, the lobes spreading.

12. *Lithospermum*.

Receptacle conical or elongated, to which the nutlets are attached more or less laterally. (*Eritrichieae*.)

Fruiting calyx not greatly enlarged and membranous.

Nutlets conspicuously armed with armed prickles, and also sometimes dorsally.

Annuals; pedicels erect in fruit; gynobase subulate.

13. *Lappula*.

Perennials or biennials; pedicels recurved in fruit; gynobase broadly pyramidal.

14. *Hackelia*.

Nutlets not armed with conspicuous prickles.

Corolla white or blue, at least not bright yellow or orange, the throat usually crested.

Corolla bright blue; low depressed perennials.

15. *Eritrichium*.

* In the concept of the species, especially in *Allocarya* and *Cryptantha*, the author has followed fairly closely the monographic treatment of Dr. I. M. Johnston.

Corolla white, sometimes cream-colored or pale yellow in the throat; mostly annuals.

Calyx circumsissile.

16. *Greeneocharis*.

Calyx not circumsissile, or rarely so in *Plagiobothrys*.

Nutlets keeled on the ventral side, not grooved or if so the groove enclosing the keel; calyx and pedicels persistent.

Lower leaves opposite, not forming a rosette; nutlets attached by a scar or groove, not carunculate, mostly erect; corolla-tube often yellowish within.

17. *Allocarya*.

Lower leaves alternate; nutlets attached above the base to a caruncle or thickened scar, oblique or incurved; corolla white throughout.

Nutlets with the caruncle borne on a stipe-like base; lowest leaves not in a rosette.

18. *Echidiocarya*.

Nutlets with the caruncle borne in a hollow or transverse groove; lowest leaves mostly in a rosette.

19. *Plagiobothrys*.

Nutlets not keeled on the ventral side, but grooved above the basal scar and attached from the scar along the ventral groove to the middle or apex; calyx and pedicels falling away with the nutlets; corolla-throat with crests; leaves all alternate.

Annuals.

Stems dichotomously branched; racemes with each flower in the axil of a foliaceous bract; style dilated in fruit; gynobase columnar.

20. *Eremocarya*.

Stems branched but not dichotomously; racemes spike-like and bractless or few-bracted, rarely bracted throughout, if so, the bracts unequal; style not dilated in fruit; gynobase subulate.

21. *Cryptantha*.

Perennials, often caespitose.

22. *Oreocarya*.

Corolla bright yellow or orange, the throat open or inconspicuously constricted, not crested.

23. *Amsinckia*.

Fruiting calyx greatly enlarged and membranous.

24. *Asperugo*.

Calyx armed with prickles, irregular and bur-like in fruit.

25. *Harpagonella*.

1. *COLDENIA* L. Sp. Pl. 125. 1753.

Low herbaceous or suffrutescent plants, canescent or hispid. Leaves small, entire, usually strongly veined. Flowers small, generally white, sessile and solitary or often clustered in the axils of the leaves, 4-merous or commonly 5-merous. Calyx deeply lobed into narrow segments. Corolla with a short tube, naked or scaly within; lobes short and rounded, imbricated. Stamens 4-5, included, their filaments adnate to the corolla-tube. Style 2-cleft or 2-parted. Ovary 2-celled or sometimes 4-celled by the septum-like placentae, entire or 4-lobed. Fruit with a thin usually dry exocarp, separating into 4 nutlets. [Name in honor of Dr. Cadwallader Colden, Colonial Lieutenant-Governor of New York and correspondent of Linnaeus.]

A genus of about 20 species, native of the western hemisphere, with one species also in the tropics of the Old World. Type species, *Coldenia procumbens* L.

Fruit merely 4-sulcate, bearing the style in its rounded summit; stems not dichotomous; leaves not conspicuously veined; perennial, woody at base.

1. *C. canescens*.

Fruit deeply 4-lobed, bearing the style between the lobes; stems dichotomously branched.

Plants perennial, stems woody below or from a stout woody root; corolla bluish.

Leaves with 4-6 rib-like veins, the surface of at least the younger ones distinctly plicate, densely white-silky pubescent, margin entire.

2. *C. plicata*.

Leaves 3-4-veined, the veins somewhat irregular, not plicate, margin somewhat sinuate.

3. *C. Palmeri*.

Plants annual, prostrate; corolla pink or white.

4. *C. Nuttallii*.

1. *Coldenia canescens* A. DC. Shrubby *Coldenia*. Fig. 4162.

Coldenia canescens A. DC. Prod. 9: 559. 1845.

Coldenia canescens var. *subnudata* I. M. Johnston, Proc. Calif. Acad. IV. 12: 1137. 1924.

Low, much-branched shrub often forming mats, 5-15 cm. high, the older main branches woody and becoming stout and gnarled. Leaves white-tomentose with intermingling short-villous hairs, oblong-lanceolate to ovate, 6-10 mm. long, plane or commonly with the entire margins revolute, longer than the petioles; calyx 4-6 mm. long; corolla white, 6-7 mm. long; style slightly exserted above the calyx-lobes; fruit depressed-globose, about 2 mm. wide, glabrous or sparsely hairy at the summit.

Rocky ridges or benches, Lower Sonoran Zone; eastern parts of the Colorado Desert, Riverside and Imperial Counties, California, east to Texas and south to Lower California and northern Mexico. Type locality: between Santander and Victoria, Tamaulipas, Mexico. March-May.

Coldenia canescens var. *pulchella* I. M. Johnston, Journ. Arnold Arb. 20: 379. 1939. Flowers larger; corolla 9-12 mm. long with the limb 5-8 mm. in diameter, blue or lavender. A local variation found in the Chocolate Mountains, Imperial County, California, and adjacent Arizona. Type locality: Kofa Mountains, Yuma County, Arizona.

2. *Coldenia plicata* (Torr.) Coville. Plicate Coldenia. Fig. 4163.

Tiquilia brevifolia var. *plicata* Torr. Bot. Mex. Bound. 136. 1859.

Coldenia Palmeri of S. Wats. and recent authors, not A. Gray.

Coldenia plicata Coville, Contr. U.S. Nat. Herb. 4: 163. 1893.

Stems several from a woody base, finely and usually openly branched dichotomously, forming a mat or rounded tuft up to 5 dm. broad; branchlets somewhat 4-angled, rather thinly short-tomentose. Leaves broadly to narrowly obovate or sometimes ovate, narrowed to a petiole of about equal length, 5-10 mm. long, conspicuously plicate by 4-7 pairs of lateral ribs, densely white-silky pubescent on both sides, with a few scattering short-hispid hairs intermingling especially toward the entire narrowly revolute margin; flowers clustered in the forks and at the ends of the branches; calyx-lobes subulate, densely villous-tomentose, especially on the inside, 2-2.5 mm. long; corolla blue or lavender, 4 mm. long, the limb about 2.5 mm. broad; style-branches exserted beyond the calyx-lobes; nutlets about 1 mm. long, ovoid or globular, smooth and shining, usually one or more aborted.

Usually in sandy soils, Lower Sonoran Zone; in the Mojave Desert along the Colorado River below Needles, and in the Colorado Desert from San Geronimo Pass east to Arizona and south to Lower California. Type locality: "desert west of the Colorado, California." April-Aug.

3. *Coldenia Palmeri* A. Gray. Palmer's Coldenia. Fig. 4164.

Coldenia Palmeri A. Gray, Proc. Amer. Acad. 8: 292. 1870.

Coldenia brevicalyx S. Wats. Proc. Amer. Acad. 24: 62. 1889.

Stems several from the crown of deep-seated woody roots, woody at base, fimbriate or spreading forming a mat or rounded tuft, 2-4 dm. high, branchlets dichotomous, thinly hirsutulous-tomentose, the whitish bark exfoliating in age. Leaves ovate, obovate or rhombic, 4-10 mm. long on petioles as long or longer, the margins sinuate-revolute, irregularly veined with 2-3 pairs of lateral veins impressed on the back but not plicate, appressed-pubescent and with a few scattering hispid hairs especially near the margin; calyx 2-3.5 mm. long, glabrescent or short-pubescent within; corolla 5-7 mm. long; nutlets nearly globose, about 1 mm. in diameter.

Sandy soil, Lower Sonoran Zone; western side of the Colorado Desert, California, east to southwestern Nevada and western Colorado, south to Lower California. Type locality: lower Colorado River. April-June.

4. *Coldenia Nuttallii* Hook. Nuttall's Coldenia. Fig. 4165.

Coldenia Nuttallii Hook. Kew Journ. Bot. 3: 296. 1851.

Tiquilia parviflora Nutt. ex Hook. loc. cit. as a synonym.

Tiquilia brevifolia Nutt. ex Torr. Bot. Mex. Bound. 136. 1859.

Prostrate annual, with slender dichotomously branching stems forming a mat 1-3 dm. broad, rather thinly appressed-pubescent. Leaves ovate to suborbicular, 4-8 mm. long, narrowly revolute and often hispid on the margin, with 2-3 pairs of rather distinct veins impressed on the back, thinly strigose on the upper surface with rather stiff hairs, the hairs a little longer and more spreading on the lower surface; petioles slender, usually as long or longer than the leaves; flowers in compact clusters in the forks and at the ends of the branches; calyx-lobes linear-subulate, 4-5 mm. long, villous on the back and sparsely but conspicuously hispid on the margins; corolla pink or nearly white, little exceeding the calyx, the limb 2-2.5 mm. broad, the tube with 5 triangular scales near the base; nutlets oblong-ovoid, smooth and shining.

Sandy or alkaline places, on plains and hillsides, lower Arid Transition Zone to Lower Sonoran Zone; eastern Washington southward east to the Cascade-Sierra Nevada Divide to the Mojave Desert, California, east to Idaho, Nevada, Wyoming, and Utah. Type locality: "Rocky Mountains." Collected by Nuttall. May-Aug.

2. *EUPLOCA* Nutt. Trans. Amer. Phil. Soc. II. 5: 189. 1837.

Low branching usually pubescent annuals with alternate leaves. Flowers scattered, solitary in the leaf-axils. Calyx-lobes 5. Corolla salverform, the tube cylindric, naked in the throat, limb 5-angled, strongly plicate in the bud. Stamens 5; anthers slightly cohering by their minutely bearded tips. Ovary 4-celled; style long and filiform; apex of the stigma truncate and bearded with a tuft of penicillate bristles. Fruit didymous, the two lobes each splitting into 2 hemispherical 1-seeded nutlets. [Name Greek, meaning well and a woven thing.]

A monotypic genus of the arid southwestern United States and Mexico. Type species, *Euploca convolvulacea* Nutt.

1. *Euploca convolvulacea* subsp. *californica* (Greene) Abrams. Bindweed Heliotrope or Euploca. Fig. 4166.

Heliotropium californicum Greene, Bull. Calif. Acad. 1: 202. 1885.

Heliotropium convolvulaceum var. *californicum* I. M. Johnston, Contr. Arnold Arb. No. 3: 83. 1932.

Euploca albiflora var. *californica* Jepson & Hoover in Jepson, Fl. Calif. 3: 299. 1943.

Stems branched and usually spreading, 4-10 cm. high, the entire plant more or less densely hispid with both spreading and upwardly appressed whitish hairs pustulate at the base. Leaves varying from broadly ovate to narrowly lanceolate, commonly ovate, 1.5-3 cm. long, acute or abruptly short-acuminate at apex, rounded to acutish at base, grayish green and densely hispid on both sides, the hairs except on the margin more or less appressed; flowers borne solitary near

the base of the petiole or on the opposite side of the stem, 2-4 mm. long; calyx-lobes linear-lanceolate, attenuate above the nutlets; corolla white, fragrant, densely appressed-hispid exteriorly, the tube 5-8 mm. long, the limb 8-10 mm. broad; nutlets smooth and glabrous, 2 mm. high.

Open sandy desert playas and hills, Lower Sonoran Zone; eastern Mojave Desert, San Bernardino County and eastern Colorado Desert, Riverside County, California, east to adjacent Arizona. Type locality: Amboy, Mojave Desert, San Bernardino County. April-May.

3. *HELIOTRÔPIUM* [Tourn.] L. Sp. Pl. 130. 1753.

Herbs or shrubs with alternate mostly entire petioled leaves. Flowers small, usually in terminal scorpioid spikes or racemes, or rarely scattered. Calyx-lobes 5, narrow. Corolla blue or white, commonly funnelliform; lobes 5, imbricated or induplicate, inflexed at the tip. Stamens 5, included; filaments adnate to the corolla-tube; anther-sacs sometimes appendaged at the tip. Ovary 4-celled or 2-celled and with 2 more or less intruding placentae; styles united. Ovules entire or 2-4-grooved, pendulous with lateral attachments. Fruit 4-grooved or 4-lobed, or sometimes didymous but separating into 4 nutlets. [Name Greek, meaning sun-turning, in reference to the summer solstice, when the first-described species was supposed to bloom.]

About 125 species, widely distributed in warm-temperate and tropical regions. Type species, *Heliotropium europaeum* L.

1. *Heliotropium curassavicum* L. Seaside Heliotrope. Fig. 4167.

Heliotropium curassavicum L. Sp. Pl. 130. 1753.

Annual or short-lived perennial, fleshy, glaucous, glabrous throughout; stems diffusely branching, 1-6 dm. long. Leaves succulent, varying from linear to obovate, but commonly spatulate, 1-4 cm. long, obtuse, narrowed to a thick petiole; spikes mostly in pairs sometimes 3 to 5, often 6-12 cm. long; calyx-segments ovate-lanceolate, acute, 2-3 mm. long; corolla 3-5 mm. long, white with violet-purple eye on the throat; stigma glabrous; stamens included, the anthers subsessile; fruit subglobose, at length separating into 4 nutlets.

Usually in more or less alkaline or saline places, Sonoran and Transition Zones; Washington south to southern California, east across the continent and south into Mexico; widely distributed in all continents. Type locality: "Habitat in Americae calidioris maritimis." Mar.-Oct.

Two varieties more or less geographically distinct are usually recognizable in the Pacific States, but the characters are not constant.

Heliotropium curassavicum var. *obovatum* A. DC. Prod. 9: 538. 1845. (*Heliotropium spathulatum* Rydb. Bull. Torrey Club 30: 262. 1903.) Leaves spatulate to obovate; corolla white or slightly tinged with blue, 6-8 mm. and the limb about as broad; nutlets 2.5-3 mm. long. Eastern Washington, eastern Oregon and northwestern Nevada, east to the Rocky Mountains. Type locality: "Columbia River," probably near the Blue Mountains, Oregon.

Heliotropium curassavicum var. *oculatum* (Heller) I. M. Johnston ex Tidestrom, Proc. Biol. Soc. Wash. 48: 42. 1935. (*Heliotropium oculatum* Heller, Muhlenbergia 1: 58. 1904; *H. spathulatum* subsp. *oculatum* Ewan, Bull. S. Calif. Acad. 4: 56. 1942.) Middle cauline leaves oblanceolate to spatulate, smaller lower and upper ones commonly oblong and acutish; corolla-limb about 4 mm. wide, the lobes white or bluish and the throat with a violet-purple eye. Coastal northern California, Sacramento and San Joaquin Valleys to Lower California, east to the Mojave and Colorado Deserts. Type locality: sand along the Russian River near Healdsburg, Sonoma County, California.

4. *PECTOCÁRYA* DC. ex Meisn. Gen. 279. 1840.

Low often spreading annual herbs, with slender stems and narrowly linear leaves, canescent with a close-appressed pubescence. Flowers scattered along the stems or branches, on short pedicels, solitary in the axils. Calyx 5-parted, the lobes narrow, spreading or reflexed in fruit. Corolla white, tube shorter than the calyx, lobes broadly oval, the throat nearly closed by prominent crests. Stamens included. Style very short. Nutlets flattened, thin, widely divergent either radiately or in pairs, their margins, at least toward the apex, with a row of hooked bristles. [Name Greek, meaning combed and nut, referring to the pectinate border of the nutlets.]

About 10 species natives of western North America and Peru and Chile. Type species, *Cynoglossum lateriflorum* Lam.

Nutlets divergent in pairs; calyx-lobes not uncinately bristly at apex.

Nutlets oblong or linear, the body without uncinately bristles.

Nutlets not heteromorphic, all 4 wing-margined or toothed.

Nutlets with margins pectinately toothed, the teeth ending in uncinately bristles on the sides, and also bearing a tuft of uncinately bristles at the apex.

Margin of the nutlet very narrow or wanting, the teeth being nearly or quite distinct.

Nutlets straight or slightly incurved, uncinately bristly only at apex and base.

1. *P. linearis ferocula*.

2. *P. recurvata*.

Margin of nutlet conspicuous, the teeth confluent at base.

3. *P. platycarpa*.

Nutlets with margins entire or undulate along the sides, armed only at the apex with uncinately bristles.

4. *P. penicillata*.

Nutlets heteromorphic, 1 of each divergent pair wingless, or merely margined, the other with a broad somewhat incurved uncinately-toothed wing.

5. *P. heteracarpa*.

Nutlets orbicular or nearly so, both the body and the very thin conspicuous wing beset with slender uncinately bristles.

6. *P. sciosa*.

Nutlets equally divergent, cuneate- or obovate-rhomboid; calyx with uncinately bristles at apex.

7. *P. pusilla*.

1. *Pectocarya lineàris* var. *ferócula* I. M. Johnston. Slender *Pectocarya*.
Fig. 4168.

Pectocarya linearis var. *ferocula* I. M. Johnston, Contr. Arnold Arb. No. 3: 95. 1932.

Stems slender, usually diffusely branched from the base, spreading or prostrate, 8–25 cm. long, herbage canescent-strigillose throughout. Leaves narrowly linear, acute, 5–25 mm. long, 1 mm. or less wide; calyx-lobes 1.5–2 mm. long, strigillose; corolla about 2 mm. long; nutlets divergent in pairs, narrowly oblong, the margin winged on the sides and pectinately toothed, the 5–7 teeth dilated at base and slightly united, the apex uncinately-bristly.

Dry usually sandy or gravelly slopes and mesas, Upper and Lower Sonoran Zones; islands off the coast of southern California and on the mainland from San Benito and Monterey Counties south in the cismontane region to San Diego County, and Lower California; also in Argentina. Type locality: "steep grassy slopes, Lady Harbor, Santa Cruz Isl.," California. March–May.

2. *Pectocarya recurvata* I. M. Johnston. Recurved *Pectocarya*.
Fig. 4169.

Pectocarya recurvata I. M. Johnston, Contr. Arnold Arb. No. 3: 97. 1932.

Stems slender, simple below, with 2 to several erect or ascending branches above, or sometimes diffusely branched throughout and more spreading, 5–25 cm. long; herbage cinereous-strigose. Leaves narrowly linear, acute, 1–3.5 cm. long, 0.5–2 mm. wide; calyx-lobes barely 2 mm. long in fruit, acute; nutlets divergent in pairs, linear, strongly recurved, the wing divided to or almost to the body into prominent subulate straw-colored uncinately bristles, at the apex the wing prolonged into a short scarious tip, uncinately-bristly on the margin.

Sandy and gravelly mountain slopes and benches, Lower Sonoran Zone; Mojave and Colorado Deserts from the Panamint Mountains, Inyo County, California, southward to Lower California and eastward to southern Nevada, Arizona, and Sonora. Type locality: near Chandler, Maricopa County, Arizona. March–May.

3. *Pectocarya platycarpa* Munz & Jtn. Broad-fruited *Pectocarya*. Fig. 4170.

Pectocarya gracilis var. *platycarpa* Munz & Jtn. Contr. Gray Herb. No. 70: 36. 1924.

Pectocarya platycarpa Munz & Jtn. Contr. Gray Herb. No. 81: 81. 1928.

Stems slender, diffusely branched from the base, prostrate or widely ascending 5–20 cm. long, cinereous-strigillose throughout. Leaves narrowly linear to linear-oblancoelate, 0.5–1.5 mm. wide, 1–3.5 cm. long; calyx-lobes nearly as long as the nutlets; corolla 2 mm. long; nutlets divergent in pairs, sometimes heteromorphous, linear-oblong or spatulate-oblong, 2.5–3 mm. long, with a wide conspicuous stramineous margin bearing irregular uncinately-tipped teeth, the odd nutlet, when differentiated, with more deeply dissected wing and with more pubescent body.

Dry gravelly slopes and benches, Lower Sonoran Zone; Mojave Desert, California, east to southern Nevada and Utah, south through the Colorado Desert to Lower California and Sonora. Type locality: mesas near Camp Lowell, Arizona. Feb.–May.

4. *Pectocarya penicillata* (Hook. & Arn.) A. DC. Winged *Pectocarya*.
Fig. 4171.

Cynoglossum penicillatum Hook. & Arn. Bot. Beechey 371. 1838.

Pectocarya penicillata A. DC. Prod. 10: 120. 1846.

Pectocarya linearis var. *penicillata* M. E. Jones, Proc. Calif. Acad. II. 5: 709. 1895.

Pectocarya miser A. Nels. Bot. Gaz. 37: 278. 1904.

Stems more or less diffusely branched from the base, ascending or spreading, 5–20 cm. long, herbage canescently strigose. Leaves narrowly linear to almost filiform, the margins often revolute; nutlets divergent in pairs, all similar, oblong, 2–3 mm. long, margin of the nutlets prominently unequal; wing fringed at apex with slender hooked bristles, narrower and without bristles in the middle, broader at the base and with a few minute bristles; all the bristles slender, not triangular-dilated at base.

Dry sandy or gravelly soils, Arid Transition Zone to Lower Sonoran Zone; British Columbia and eastern Washington south through the Pacific States to Lower California, and eastward to Idaho, Nevada, western Wyoming, Arizona, and Sonora. Type locality: California. Collected by Douglas. Feb.–June.

5. *Pectocarya heterocarpa* I. M. Johnston. Chuckwalla *Pectocarya*.
Fig. 4172.

Pectocarya penicillata var. *heterocarpa* I. M. Johnston, Contr. Gray Herb. No. 70: 37. 1924.

Pectocarya heterocarpa I. M. Johnston, Journ. Arnold Arb. 20: 399. 1939.

Diffusely branched from the base; stems slender, ascending or spreading, 3–15 cm. long, strigose and canescent throughout. Leaves narrowly linear, 1–3 cm. long, 1–2 mm. wide, the hairs on the basal ones often pustulate at base; corolla minute, its limb about 1.5 mm. broad; fruiting nutlets widely divergent dissimilar, 2 narrower and with or without a narrow margin, and 2 prominently wing-margined, the wings pectinately bristly at the apex, irregular, few-toothed and with or without scattering bristles on the sides.

Sandy or gravelly plains and slopes, Lower Sonoran Zone; western edges of San Joaquin Valley, Kern County, south through the Mojave and Colorado Deserts, California, to Lower California, southern Nevada, Arizona, and Sonora. Type locality: Corn Springs, Chuckwalla Valley, Riverside County. Jan.–May.

6. *Pectocarya setosa* A. Gray. Bristly *Pectocarya*. Fig. 4173.

Pectocarya setosa A. Gray, Proc. Amer. Acad. 12: 81. 1876.

Gruvelia setosa Rydb. Bull. Torrey Club 40: 479. 1913.

Pectocarya setosa var. *aptera* I. M. Johnston, Contr. Gray Herb. No. 70: 38. 1924.

Pectocarya setosa var. *holoptera* I. M. Johnston, op. cit. 39.

Stem usually diffusely branched from the base, ascending, slender to rather stout, 5–20 cm. high, herbage rather thinly strigose and setose with spreading bristle-like hairs. Leaves linear to linear-oblancoate, 5–20 mm. long; calyx-lobes narrowly linear, 3–4 mm. long in fruit, armed with 3–6 stout straight divergent bristles; nutlets divergent in pairs, broadly obovate or orbicular, 2 borders all around with a thin scarious wing, 2 wingless, the body of the nutlets and usually the wing bearing slender uncinat bristles, the wing usually slightly undulate and slightly curved upward saucer-like.

Dry sandy or gravelly flats or slopes, Upper and Lower Sonoran Zones; Yakima County, eastern Washington and central Idaho southward through the arid region east of the Cascades and the Sierra Nevada to the deserts of southern California, and Lower California, east to Idaho, Utah, and Arizona. Type locality: "desert plains of the upper Mohave River." April–June.

7. *Pectocarya pusilla* (A. DC.) A. Gray. Little *Pectocarya*. Fig. 4174.

Gruvelia pusilla A. DC. Prod. 10: 119. 1846.

Pectocarya chilensis var. *californica* Torr. Pacif. R. Rep. 4: 124. 1857.

Pectocarya pusilla A. Gray, Proc. Amer. Acad. 12: 81. 1876.

Pectocarya pusilla var. *flagillaris* Brand, Pflanzenreich 4³²: 96. 1921.

Stems very slender, simple or few-branched, or sometimes diffusely branched from the base, 10–20 cm. long, herbage rather sparingly strigose. Leaves linear or narrowly oblanceolate, 5–15 mm. long; calyx-lobes hispidulous and with several uncinat bristles at the tip; corolla barely equaling the calyx; nutlets 4, or rarely reduced to 2, uniformly divergent, cuneate-rhomboid, 2.5–3 mm. long, upper face slightly concave between the central rib and the raised margin, sparsely hirsutulous and bearing conspicuous uncinat bristles on the margin.

Open woods, Upper Sonoran and Transition Zones; Klickitat County, Washington, and Wasco County, Oregon, south to Monterey and Kern Counties, California; also in Chile. Type locality: Chile. April–June.

5. *CYNOGLÓSSUM* [Tourn.] L. Sp. Pl. 134. 1753.

Perennial or biennial, mostly tall herbs with the basal leaves usually long-petioled and the flowers purple, blue or white in usually bractless and more or less scorpioid in paniculate racemes. Calyx 5-cleft or 5-parted, the segments often enlarged and spreading or reflexed in fruit. Corolla funnelform or salverform, the tube short, the throat closed by 5 scales opposite the imbricated rounded lobes. Stamens included; filaments short. Ovary deeply 4-lobed, separating into 4 diverging nutlets; style slender. Nutlets equally divergent, horizontal, or obliquely ascending in a depressed gynobase, covered all over with short barbed prickles. [Name Greek, meaning hound's tongue.]

A genus of about 75 species of wide geographic distribution. Type species, *Cynoglossum officinale* L.

Biennial; nutlets ascending on the pyramidal gynobase, the depressed upper surface surrounded by a raised margin; leaves lanceolate to oblong; introduced species. 1. *C. officinale*.

Perennials; nutlets horizontal or nearly so, on a depressed gynobase, rounded on the back and without a raised margin; native species.

Stems hirsute-pubescent; lower leaves oblanceolate or spatulate, gradually narrowed to the winged petioles. 2. *C. occidentale*.

Stems glabrous; lower leaves broadly ovate, abruptly narrowed to an elongated petiole. 3. *C. grande*.

1. *Cynoglossum officinale* L. Hound's Tongue. Fig. 4175.

Cynoglossum officinale L. Sp. Pl. 134. 1753.

Biennial, villous-tomentose throughout; stems stout, erect, leafy to the top, 4–5 dm. high. Lower leaves oblong to oblong-lanceolate, slender-petioled, 15–30 cm. long, 2–7 cm. wide; upper leaves lanceolate, acute or acuminate, sessile or the uppermost clasping; racemes several to many, simple or branched, sparingly bracted or bractless; much-elongated in fruit; pedicels 5–12 mm. long; calyx-lobes ovate-lanceolate, obtuse or acutish, 5–7 mm. long in fruit; corolla reddish purple, the broad tube 3–5 mm. long, the limb 6–8 mm. broad; nutlets ascending on the pyramidal gynobase, about 6 mm. high, flattened on the upper surface and margined, splitting away from the gynobase at maturity but hanging attached to the subulate style.

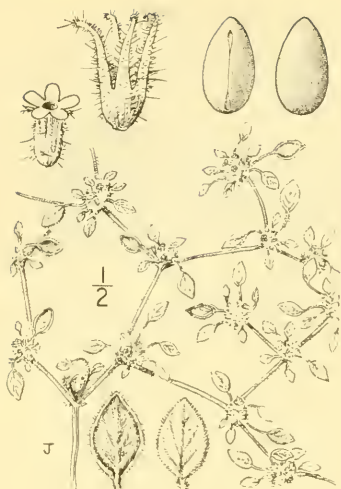
Native of Europe and Asia, but introduced and widely distributed over central and eastern North America. In the Pacific States it has become established in Oregon, especially in Wallowa and Marion Counties. Type locality: Europe. May–July.

2. *Cynoglossum occidentale* A. Gray. Western Hound's Tongue. Fig. 4176.

Cynoglossum occidentale A. Gray, Proc. Amer. Acad. 10: 58. 1874.

Cynoglossum viride Eastw. Proc. Calif. Acad. II. 6: 428. pl. 59. 1896.

Perennial, the stems 1 to several from the rootcrown, erect, 2–4 dm. high, herbage rather thinly hirsute throughout with recurved or somewhat spreading hairs, or more densely so and somewhat canescent. Lower leaves oblanceolate or linear-oblancoate, narrowed to a winged petiole, and including it, often 20–25 cm. long; the upper shorter becoming sessile or cordate-



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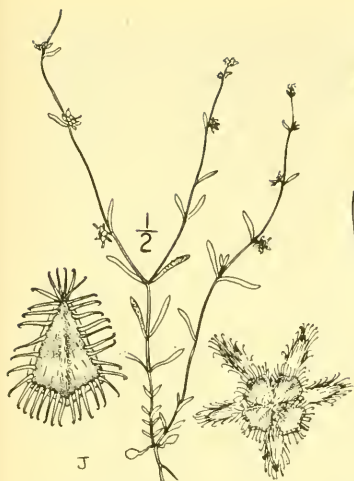


4173

4165. *Coldenia Nuttallii*
 4166. *Euploca convolvulacea*
 4167. *Heliotropium curassavicum*

4168. *Pectocarya linearis*
 4169. *Pectocarya recurvata*
 4170. *Pectocarya platycarpa*

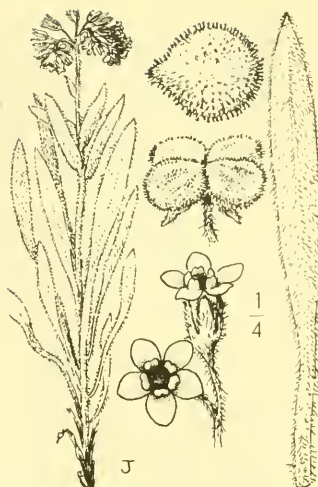
4171. *Pectocarya penicillata*
 4172. *Pectocarya heterocarpa*
 4173. *Pectocarya setosa*



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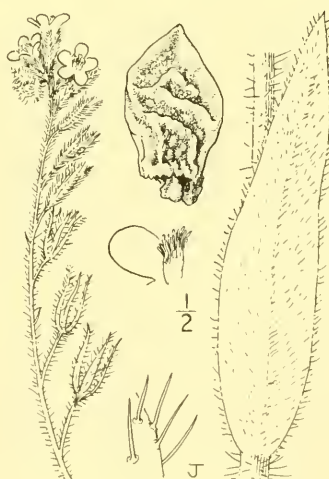
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4174. *Pectocarya pusilla*
 4175. *Cynoglossum officinale*
 4176. *Cynoglossum occidentale*

4177. *Cynoglossum grande*
 4178. *Borago officinalis*
 4179. *Symphytum asperum*

4180. *Lycopsis arvensis*
 4181. *Anchusa azurea*
 4182. *Myosotis scorpioides*

clasping and oblong to lanceolate; panicles rather long peduncled, small, usually of only 2 or 3 short branches, villous-hirsute; calyx 5–7 mm. long, lobes linear-lanceolate; corolla blue, more or less tinged with pink or brownish pink, tube 4–6 mm. long, limb about as broad; nutlets widely spreading, broadly obovoid, 7–9 mm. long, rounded on the upper surface and evenly and densely covered with glochidiolate spines.

Open pine forests, Arid Transition Zone; Jackson County in western Oregon, and on the eastern slope of the Cascade Mountains from Jefferson County south to northern Humboldt and Trinity Counties in the Coast Ranges and to the central Sierra Nevada, California. Type locality: "Sierra Nevada, in the northeastern part of California, Rev. Mr. Burgess, and Sierra County, J. G. Lemmon." May–Aug.

3. *Cynoglossum grande* Dougl. Grand Hound's Tongue. Fig. 4177.

Cynoglossum grande Dougl. ex. Lehm. Stirp. Pug. 2: 25. 1830.

Cynoglossum laeve A. Gray, Syn. Fl. N. Amer. 2: 188. 1878.

Cynoglossum grande var. *laeve* A. Gray, op. cit. ed. 2. 2: 421. 1886.

Cynoglossum Austiniae Eastw. Bull. Torrey Club 32: 203. 1905.

Perennial, stems erect, 3–8 dm. high, glabrous. Leaves basal or on the lower part of the stem, ovate, 7–15 cm. long, mostly 5–10 cm. wide, long-petioled, glabrous or sparsely hirsutulous above, rather densely so below; panicle long-peduncled, loosely flowered; calyx-lobes narrowly oblong, more or less densely appressed-villous, 5–7 mm. long; corolla deep blue, the tube often purple, a little longer than the calyx-lobes, the lobes rounded; crests conspicuously lunate; nutlets depressed-globose, 5–6 mm. long.

Open or shaded ground, Transition and Upper Sonoran Zones; southern Washington in Skamania and Klickitat Counties, south mostly west of the Cascade Mountains and Sierra Nevada to San Luis Obispo and Tulare Counties, California. Type locality: "Am. bor. occid." March–June.

6. BORAGO [Tourn.] L. Sp. Pl. 137. 1753.

Hirsute or hispid annual or biennial herbs with alternate, entire leaves and blue flowers in terminal leafy racemes. Calyx deeply 5-cleft or 5-parted. Corolla rotate, tube very short, throat closed by scales, limb 5-lobed, the lobes imbricated, acute. Stamens 5, inserted on the corolla-tube; filaments dilated below, narrowed above to a slender appendage; anthers linear, erect and connivent with a beak-like cone. Ovary 4-divided; style filiform. Nutlets 4, ovoid, erect, attached by their bases to the flat receptacle; scar of attachment large, concave. [Name Middle Latin, meaning rough hair, alluding to the foliage.]

A genus of 3 species, native of the Mediterranean region. Type species, *Borago officinalis* L.

1. *Borago officinalis* L. Borage. Fig. 4178.

Borago officinalis L. Sp. Pl. 137. 1753.

Stem erect, 3–8 dm. high, with ascending or spreading branches. Leaves oblong to broadly obovate, 5–10 cm. long, rounded to acute at apex, uppermost clasping, lower narrowed to a winged petiole; pedicels spreading or recurving, 2–5 cm. long; calyx-lobes linear-lanceolate, 7–10 mm. long; corolla 15–20 mm. broad, bright blue; anther-beak dark purple, about 6–7 mm. long; nutlets 4 mm. long.

An escape from gardens and sparingly naturalized in the Pacific States. Native of Europe.

7. SYMPHYTUM [Tourn.] L. Sp. Pl. 136. 1753.

Erect, hairy, perennial herbs with thick mucilaginous roots. Leaves alternate or the uppermost nearly opposite, and more or less clasping, the lower long-petioled. Flowers yellow-blue or purple, in terminal, simple, or forked scorpioid racemes. Calyx deeply 5-cleft. Corolla tubular, slightly dilated above, 5-toothed or 5-lobed, the lobes short, the throat with 5 crests below the lobes. Stamens 5, included; inserted on the corolla-tube; filaments slender. Ovary 4-divided; style filiform. Nutlets 4, obliquely ovoid, wrinkled, inserted by their bases to the flat receptacle; scar of attachment broad, concave, dentate. [Name Greek, meaning grow-together, because of its supposed healing virtues.]

A genus of about 15 species, natives of the Old World. Type species, *Symphytum officinale* L.

1. *Symphytum asperrimum* Donn. Rough Comfrey. Fig. 4179.

Symphytum asperrimum Donn ex Sims, Bot. Mag. 24: pl. 929. 1806.

Stems erect, branched, 6–10 dm. high, from a thick deep root; herbage pubescent with rather stiff recurved hairs. Leaves 8–20 cm. long, ovate-lanceolate to oblong-lanceolate, long-acuminate at apex, narrowed at base, all but the uppermost petioled, the petioles often narrowly winged; flower-clusters rather loose; calyx 4 mm. long; corolla bluish purple, 12–15 mm. long.

Sparingly naturalized in the Pacific States: Whatcom County, Washington, and Humboldt County, California. Native of Europe. May–July.

8. LYCÓPSIS L. Sp. Pl. 138. 1753.

Bristly hispid annual herbs with alternate leaves, and small blue flowers in leafy-bracted spike-like scorpioid racemes. Calyx 5-parted. Corolla salverform and slightly

irregular, tube curved, limb somewhat unequally inserted on the tube, throat closed by hispid hairs. Stamens 5, included, inserted on the corolla-tube; filaments short. Ovary 4-divided; style filiform. Nutlets 4, wrinkled, erect, attached at base to the flat receptacle, scar of attachment concave. [Name Greek, meaning wolf-face.]

A genus of 4 or 5 species, natives of the Old World. Type species, *Lycopsis arvensis* L.

1. *Lycopsis arvensis* L. Small Bugloss. Fig. 4180.

Lycopsis arvensis L. Sp. Pl. 139. 1753.

Stem erect or ascending, 3-6 dm. high, often becoming diffusely branched and the branches procumbent. Leaves lanceolate to narrowly oblong or the lower oblanceolate, 2.5-5 cm. long, sessile, or the lower narrowed to a short petiole, obtuse at apex or the uppermost much-reduced and acutish, entire or irregularly dentate; flowers in terminal scorpioid racemes, crowded, short-pedicelled; calyx-lobes linear-lanceolate; corolla blue or purplish, tube 3-4 mm. long, curved, limb 4-5 mm. broad.

Native of Eurasia; widely naturalized in fields and waste places in eastern United States, but less frequent in the Pacific States: Upland, southern California. Jan.-Feb.

9. *ANCHUSA* L. Sp. Pl. 133. 1753.

Annual, biennial, or perennial herbs with blue or purple flowers in paniced, scorpioid racemes. Calyx divided into narrow lobes. Corolla trumpet-shaped, the tube straight, the throat closed by scales, the limb with widely spreading lobes. Stamens included. Style slender. Ovary 4-parted. Nutlets 4, their attachment surrounded by an annular ring leaving a pit on the low gynobase. [The ancient Greek name of the alkanet, and of a cosmetic derived from *Anchusa tinctoria* L.]

An Old World genus of about 40 species. Type species, *Anchusa officinalis* L.

1. *Anchusa azurea* L. Italian Anchusa or Alkanet. Fig. 4181.

Anchusa azurea Mill. Gard. Dict. ed. 8. no 9. 1768.

Anchusa italica Retz. Obs. 1: 12. 1779.

Perennial, 6-15 dm. high, coarsely hirsute, the hairs often pustulate at base. Leaves ovate-lanceolate or the upper narrower, uppermost sessile and clasping, the basal on winged petioles, often 2-5 dm. long; calyx divided almost to the base, lobes linear-acuminate; corolla blue, the limb 12-20 mm. broad; nutlets erect, oblong and nearly twice as long as broad.

Frequently cultivated in the Pacific States and locally established, especially in western (Portland, Salem, Medford) Oregon. June-Aug.

Anchusa officinalis L. Sp. Pl. 133. 1753. Leaves narrower, 1-2.5 cm. wide; calyx divided to the middle or a little below, lobes lanceolate or narrowly triangular; corolla smaller, limb 5-10 mm. broad; nutlets horizontal, ovoid, 2-3 mm. long; fruiting panicle loose and broad, racemes 6-12 cm. long. Reported (M. E. Peck, Man. Pl. Oregon) as established in the valleys of the Imnaha River, Wallowa County, Oregon. Native of Europe.

Anchusa capensis Thunb. Prod. Pl. Cap. 34. 1794. Cauline leaves narrower, usually less than 1 cm. wide; calyx-lobes deltoid, shorter than the tube; nutlets horizontal, ovoid, 1.5-2 mm. long; fruiting panicle narrow and more compact, racemes 2-5 cm. long. This South African species has been reported (I. M. Johnston, Contr. Gray Herb. No. 70: 9. 1924.) as growing spontaneously in Salem, Oregon.

10. *MYOSOTIS* [Dill.] L. Sp. Pl. 131. 1753.

Low, slender, annual or perennial herbs, diffuse or erect, with alternate entire leaves. Flowers small, blue, pink, or white in many-flowered elongated and more or less 1-sided racemes, bractless or sometimes leafy-bracted at base. Calyx 5-cleft, the lobes narrow, spreading or erect in fruit. Corolla salverform, 5-lobed, the lobes rounded, convolute in the bud, the throat crested. Stamens 5, included, inserted on the corolla-tube. Ovary 4-divided, style filiform. Nutlets erect, glabrous or pubescent, attached by their bases to the gynobase, the scar of attachment small, flat. [Name Greek, meaning mouse-ear.]

A genus of about 30 species of wide geographic distribution. Type species, *Myosotis scorpioides* L.

Calyx sparsely hairy with closely appressed short straight hairs, neither hooked nor gland-tipped.

Stems coarse, angled, often stoloniferous at base; styles usually much longer than the nutlets; corolla 6-9 mm. broad.

Stems slender, terete, branched at base, without stolons; styles shorter than the nutlets; corolla 3-6 mm. broad.

Calyx with uncinat spreading hairs, at least on the tube.

Calyx very unequally cleft, usually 2-tipped; corolla white, 1-2 mm. broad.

Calyx equally cleft or nearly so; corolla commonly blue.

Corolla-limb flat, 5-8 mm. broad.

Corolla-limb concave, 1.5-4 mm. broad.

Pedicels equaling or exceeding the fruiting calyx; calyx-lobes spreading.

Pedicels shorter than the fruiting calyx; calyx-lobes erect.

Flowers in terminal racemes, also scattered among leaves to near the base of stem; styles always shorter than nutlets.

Pedicels slender, spreading; seeds black.

Pedicels erect, or nearly so; seeds grayish buff.

Flowers all in terminal racemes, none scattered among the lower leaves; styles often much longer than nutlets, these black.

6. *M. micrantha*.

7. *M. stricta*.

styles often much longer than nutlets, these black.

1. *Myosotis scorpioides* L. Forget-me-not. Fig. 4182.

Myosotis scorpioides L. Sp. Pl. 131. 1753.

Myosotis scorpioides var. *palustris* L. loc. cit.

Myosotis palustris Lam. Fl. Fr. 2: 283. 1778.

Perennial, with slender rootstocks or stolons, herbage appressed-pubescent with straight pointed hairs; stems slender, 1.5–4 dm. long, decumbent or ascending, rooting at the lower nodes. Leaves oblanceolate to oblong-oblanceolate, 2.5–8 cm. long, 4–12 mm. wide, upper stem-leaves sessile, the lower narrowed to a winged petiole; racemes loosely many-flowered; fruiting pedicels longer than the calyx; calyx with straight appressed hairs, the lobes equal, ovate-triangular, acute, shorter than the tube, more or less spreading in fruit; corolla blue with a yellow eye, the limb flat, 6–8 mm. broad; nutlets angled and keeled on the inside.

Wet meadows and margins of streams, Transition (especially the Humid) and Canadian Zones; escaped from cultivation and well established in many localities in Washington and western Oregon and northern California; also northeastern United States. Native of Europe and Asia. May–July.

2. *Myosotis laxa* Lehm. Smaller Forget-me-not. Fig. 4183.

Myosotis laxa Lehm. Asperif. 1: 83. 1818.

Myosotis palustris var. *micrantha* Lehm. in Hook. Fl. Bor. Amer. 2: 81. 1838.

Myosotis palustris var. *laxa* A. Gray, Man. ed. 5. 365. 1867.

Perennial, with slender decumbent spreading stems, rooting at the nodes, 1.5–5 dm. long, herbage appressed-pubescent with appressed pointed hairs as in the preceding species. Leaves oblong or oblong-lanceolate to spatulate, obtuse; racemes loosely flowered; pedicels much longer than the calyx, widely spreading; calyx with straight appressed hairs, the lobes equal, ovate-lanceolate, acute, as long as the tube; corolla blue with yellow eye, limb concave, about 4 mm. broad; nutlets convex on both the dorsal and ventral side.

Wet places, in marshes and along streams, Transition and Canadian Zones; British Columbia south mainly west of the Cascade Mountains to Del Norte County, California, extending eastward to Newfoundland and northeastern United States. Type locality: "Habitat in America septentrionalis." May–Aug.

Myosotis alpestris Schmidt, Fl. Boëm. 3: 26. 1794. Howell (Fl. N.W. Amer. 492. 1901.) reported this species as ranging from "the mountains of Oregon to Kotzebue Sound and the northern Rocky Mountains." Unfortunately there are no specimens in the Howell Herbarium, and as this is the only record for the Pacific States the species inclusion in our flora must await authentication.

3. *Myosotis virginica* (L.) B.S.P. Spring or Early Scorpion Grass. Fig. 4184.

Lycopsis virginica L. Sp. Pl. 139. 1753.

Myosotis macrosperma Engelm. Amer. Journ. Sci. 46: 98. 1844.

Myosotis virginica B.S.P. Prel. Cat. N.Y. 37. 1888.

Myosotis virginica var. *macrosperma* Fernald, Rhodora 10: 55. 1908.

Annual or biennial, hirsute with mostly spreading hairs, erect, 1–3 dm. high, branched, the branches erect. Leaves oblong to linear-oblong, 1–3 cm. long, obtuse, sessile or the lower spatulate and narrowed to a short petiole; racemes terminating the branches; pedicels ascending or erect, shorter than the fruiting calyx, appressed-pubescent with straight hairs; calyx unequally 5-cleft and somewhat 2-lipped, the lobes longer than the tube, narrowly lanceolate, connivent in fruit, densely hispid, the hairs of the tube mostly hooked at the apex, those of the lobes stouter and usually straight; corolla white, limb 1–2 mm. wide; nutlets convex on the dorsal side, keeled on the ventral.

Usually in moist ground, especially in fields, Humid and Arid Transition Zones; western Washington to Idaho, south in the Pacific States through western Oregon to Trinity County, California; also generally distributed throughout eastern North America. Type locality: "in Virginia ad vias." April–June.

4. *Myosotis sylvatica* Hoffm. Wood Forget-me-not. Fig. 4185.

Myosotis sylvatica Hoffm. Deutsch. Fl. ed. 1. 61. 1791.

Perennial, with creeping rootstocks, stems solitary or often many-branched, erect or commonly decumbent, 2–4.5 dm. long, thinly to rather densely hirsute with mostly spreading hairs. Leaves thinly to densely pubescent with appressed hairs, upper sessile, oblong-lanceolate, lower and basal mostly spatulate, 1–2.5 cm. broad, narrowed at base to a more or less winged petiole of about equal length; racemes usually several; fruiting pedicels spreading, often slightly curved, the lower longer, the upper about equaling the calyx; calyx with hooked hairs except at tip of the lobes, lobes linear-lanceolate, about equaling the tube; corolla light blue, limb 5–6 mm. broad.

Garden plant, naturalized locally in moist shady places; Humboldt County to San Mateo County, California. Type locality: in Europe. Feb.–July.

5. *Myosotis arvensis* (L.) Hill. Field Scorpion Grass or Mouse-ear. Fig. 4186.

Myosotis scorpioides var. *arvensis* L. Sp. Pl. 131. 1753.

Myosotis arvensis Hill, Veg. Syst. 7: 55. 1764.

Myosotis intermedia Link in Schultz, Prod. Fl. Starg. Suppl. 1: 12. 1819.

Annual or biennial, stems erect or ascending, branched, 1.5–4.5 dm. high, hirsute-pubescent. Basal leaves petioled, oblanceolate, obtuse; stem-leaves sessile, the lower oblanceolate, the upper oblong or oblong-oblanceolate, 1–3 cm. long; racemes loosely flowered; fruiting pedicels, except

the uppermost, longer than the calyx, some of the hairs on the tube minutely hooked at apex, those on the lobes bristly and straight, lobes narrowly triangular-lanceolate, about equaling or longer than the tube; corolla blue or white, limb 2–3 mm. wide, concave; nutlets dark brown and glossy, convex on the dorsal, ventral side angled by the prominent keel, lateral angles narrowly margined.

In fields and waste places; frequent in western Washington and western Oregon. Adventive from Europe, but more widely naturalized in eastern United States. April–July.

6. *Myosotis micrantha* Pall. Blue Scorpion Grass. Fig. 4187.

Myosotis micrantha Pall. in Lehm. Neue Schr. Naturf. Ges. Halle 3²: 24. 1817.

Annual or biennial, stems slender, 1–2 dm. high, simple or branched, usually from near the base, erect or ascending, rather thinly hirsute-pubescent toward the base, appressed-pubescent above. Leaves with thinly hirsute-pubescent spreading hairs, the basal oblanceolate, narrowed to a narrowly winged petiole, often with uncinata hairs, stem-leaves narrowly linear-oblong to oblong-lanceolate, sessile, obtuse or acutish; racemes slender, rather distinctly flowered; fruiting pedicels very slender, much shorter than the calyx, appressed-puberulent; calyx-lobes about equal, triangular-lanceolate, about equaling the tube in fruit, hairs on the tube spreading and minutely hooked at apex, those on the lobes straight and appressed; style shorter than the nutlets, these 1 mm. long, black.

Fields and roadsides; adventive in western Oregon, and coastal northwestern California; naturalized in eastern United States; native of Europe. May–July.

7. *Myosotis stricta* Link. Strict Scorpion Grass. Fig. 4188.

Myosotis stricta Link in Roem. & Sch. Syst. Veg. 4: 104. 1819.

Annual, stems usually branched from near the base, slender, erect or ascending, 8–15 cm.



4183. *Myosotis laxa*
4184. *Myosotis virginica*

4185. *Myosotis sylvatica*
4186. *Myosotis arvensis*

4187. *Myosotis micrantha*
4188. *Myosotis stricta*

high, cinereous throughout, pubescence more or less spreading below, appressed above. Basal leaves oblanceolate, 5–10 mm. long, rounded or obtuse at apex, abruptly narrowed to a rather short winged petiole, thinly pubescent above, glabrous beneath except the midrib; stem-leaves oblong, sessile, rather densely appressed-pilose; raceme simple, extending to near the base of the branches, bracteate below, naked above; pedicels ascending, rather stout, 1 mm. long or less; fruiting calyx 3–4 mm. long, the lobes triangular-subulate, about equaling or slightly longer than the tube, appressed-pubescent, the tube also clothed with spreading hooked bristles; style shorter than the nutlets, these buff-colored; corolla blue.

Well established on sandy plains and in open pine forests, Arid Transition Zone; Stevens County, north-eastern Washington; also in eastern North America; native of Europe and northern Asia. May–June.

8. *Myosotis versicolor* (Pers.) Smith. Yellow and Blue Scorpion Grass.

Fig. 4189.

Myosotis arvensis var. *versicolor* Pers. Syn. Pl. 1: 156. 1805.

Myosotis versicolor Smith, Engl. Bot. 7: pl. 480. fig. 1. 1798, and 36: under pl. 2558. 1814.

Annual, stems branching from the base or commonly simple below and branching above, 15–30 cm. high, hirsute below with spreading hairs, appressed-pubescent above with straight hairs. Basal leaves spatulate, narrowing to a petiole often as long as the blade, stem-leaves oblong, sessile, obtuse at apex, or the uppermost reduced, oblong-lanceolate and acute; racemes loosely flowered; pedicels usually ascending, much shorter than the fruiting calyx; calyx-tube with spreading, minutely hooked hairs, the lobes narrowly linear-lanceolate, rather densely appressed-pubescent; corolla pale yellow changing to violet and blue, limb about 2 mm. broad; style longer than the mature nutlets.

Fields, waste places and roadsides, mainly Humid and Arid Transition Zones; Olympic Peninsula and Whatcom County, Washington, to Sonoma and Plumas Counties, California; also, but more sparingly, east of the Cascades; Stevens County, Washington, and Wallowa County, Oregon; naturalized from Europe. April–July.

11. *MERTENSIA* Roth, Catal. Bot. 1: 34. 1797.

Perennial, glabrous or pubescent herbs, with broad, alternate leaves and rather larger blue, purple or white flowers in terminal panicles, cymes or racemes. Calyx-lobes linear to lanceolate, little enlarged in fruit. Corolla tubular-funnelform or trumpet-shaped, unappendaged or crested in the throat, the lobes little spreading. Stamens inserted on the corolla-throat, included or slightly exserted, filaments flattened or filiform; anthers oblong or linear. Ovary 4-divided; style filiform. Nutlets erect, coriaceous, wrinkled when mature, attached above their base to the convex or flattened receptacle. [Name in honor of the German botanist, C. F. Mertens.]

A genus of about 45 species, natives of the northern hemisphere, especially developed in western North America. Type species, *Mertensia pulmonarioides* Roth.

- | | |
|---|------------------------------------|
| Corolla campanulate, not divided into a tube and limb. (<i>Neuranthia</i>) | 1. <i>M. bella</i> . |
| Corolla not campanulate, divided into a tube and limb. (<i>Eumertensia</i>) | |
| Cauline leaves with lateral veins. | |
| Corolla-limb longer than the tube. | |
| Anthers rarely over 3 mm. long, usually straight; leaves glabrous above, pubescent beneath. | 2. <i>M. paniculata borealis</i> . |
| Anthers 4–5 mm. long, usually curved; calyx-lobes 5–7 mm. long. | 3. <i>M. platyphylla</i> . |
| Corolla-limb shorter than the tube or about equaling it. | |
| Calyx-lobes obtuse or acutish, ovate or oblong. | 4. <i>M. ciliata</i> . |
| Calyx-lobes acute, lanceolate or triangular; anthers 1.5–2.5 mm. long. | 5. <i>M. umbratilis</i> . |
| Cauline leaves without lateral veins; corolla-tube usually much shorter than the limb. | |
| Plants with stout elongated root. | 6. <i>M. oblongifolia</i> . |
| Plants with shallow-seated tuberous roots. | 7. <i>M. longiflora</i> . |

1. *Mertensia bella* Piper. Oregon Lungwort. Fig. 4190.

Mertensia bella Piper, Proc. Biol. Soc. Wash. 31: 76. 1918.

Mertensia siskiyouensis Applegate, Contr. Dudley Herb. 1: 154. 1930.

Stem solitary from a globose tuber, 2–5 dm. high, slender, glabrous to sparsely pilose, simple or with 1 or 2 short branches at the apex. Leaves elliptic to ovate, 2–5 cm. long, the uppermost reduced and lanceolate, the lower obtuse or rounded at apex, glabrous beneath, strigose above; racemes 2–4, in usually long slender peduncles in the upper axils; pedicels 6–12 mm. long, strigose; calyx-lobes 3–4 mm. long, linear-lanceolate, acute, strigose; corolla bright blue, 5–7 mm. long; tube short, about half as long as the calyx, dilating into the broad campanulate limb, lobes about 2 mm. long, broadly ovate; style half as long as the corolla.

Moist slopes, mainly Canadian Zone; western slopes of the Cascades, Lane County, and the Siskiyou Mountains, Josephine County, Oregon. Type locality: Horse Pasture Mountain, Lane County, Oregon. May–July.

2. *Mertensia paniculata* var. *borealis* (J. F. Macbride) L. O. Williams. Tall Lungwort. Fig. 4191.

Mertensia pratensis var. *borealis* J. F. Macbride, Contr. Gray Herb. No. 48: 8. 1916.

Mertensia paniculata var. *borealis* L. O. Williams, Ann. Mo. Bot. Gard. 24: 49. 1937.

Mertensia brachycalyx Piper, Contr. U.S. Nat. Herb. 11: 477. 1906.

Mertensia leptophylla Piper, op. cit. 478.

Stems 1 to several from a stout elongated root, 1–7 dm. high, glabrous or sparingly pubescent. Basal leaves 5–20 cm. long, 2.5–10 cm. wide, elliptic-lanceolate to ovate-subcordate, acute to acuminate, lower surface thinly pubescent with spreading hairs or glabrous, upper surface short-strigillose or sometimes glabrate, pinnately veined, their petioles 10–25 cm. long; cauline leaves 5–18 cm. long, 1–8 cm. broad, ovate to lanceolate, sharply acuminate, petioles winged, gradually shorter upward on the stem; inflorescence a modified scorpioid cyme, elongated in age; pedicels strigose; calyx-lobes narrowly linear-lanceolate, ciliate on the margin, glabrate or strigose on the back; corolla blue, rarely white, often pink when young, tube 4.5–7 mm. long, the limb 6–9 mm. long, a little longer than the tube, well-expanded, pubescent or glabrous within; anthers 2.2–3.3 mm. long; style about as long as or exceeding the corolla.

Moist woods and meadows, mainly Canadian Zone; southern British Columbia, Olympic and Cascade Mountains, Washington to the Cascades, Oregon, east to Idaho and western Montana. Type locality: "divide between St. Joe and Clearwater rivers," Idaho. June–July.

Mertensia paniculata (Ait.) G. Don, Gen. Hist. Pl. 4: 318. 1838. (*Pulmonaria paniculata* Ait. Hort. Kew. 1: 181. 1789.) The typical species reaches the Pacific States in Stevens and Spokane Counties, north-eastern Washington. It differs mainly from the variety *borealis* in having the upper surface of the leaves scabrous with short-appressed hairs and the lower surface with rough spreading hairs. This typical form of the species ranges from Alaska and the Yukon to Quebec and south to British Columbia, Idaho, Montana, and Wisconsin, reaching the Pacific States in northeastern Washington (Ferry, Stevens, and Spokane Counties). Type locality: Hudson Bay.

3. *Mertensia platyphylla* Heller. Broad-leaved Lungwort. Fig. 4192.

Mertensia platyphylla Heller, Bull. Torrey Club 26: 548. 1899.

Mertensia paniculata var. *platyphylla* G. N. Jones, Univ. Wash. Pub. Biol. 5: 220. 1936.

Stems 1 or few from the elongated root, erect 3–9 dm. high, glabrous or with scattering recurved or spreading hairs. Basal leaves ovate to oblong-ovate, rather abruptly acuminate at apex, usually subcordate at base, mostly 6–10 cm. long, shorter than the rather slender petioles; cauline leaves 5–10 cm. long, ovate-lanceolate to ovate, acuminate at apex, obtuse at base, the lower on petioles about half as long as the blade, the uppermost short-petioled or subsessile, thinly and minutely strigose on the upper surface, glabrous or sparingly hairy especially on the veins beneath; scorpioid cymes congested at first, becoming elongated in age; pedicels strigose; calyx-lobes linear-lanceolate, usually glabrous without, strigose within, ciliate on the margins, about 6 mm. long in flower, 10–12 mm. long in fruit; corolla blue, the tube 2.5–6 mm. long, the limb moderately expanded, 6–9 mm. long, always exceeding the tube; crests conspicuous; anthers 4–5 mm. long; style equaling or a little longer than the corolla; nutlets 5–7 mm. long, rugosely roughened all over or sometimes smooth on the inner face.

Edges of moist woods and along streams, Humid Transition Zone; western Washington in the Puget Sound region and Chehalis County south at least to the Nisqually River. Type locality: near Montesano, altitude 200 feet, Chehalis County. May–Aug.

Mertensia platyphylla var. *subcordata* (Greene) L. O. Williams, Ann. Mo. Bot. Gard. 24: 60. 1937. (*Mertensia subcordata* Greene, Pittonia 4: 89. 1899; *M. paniculata* var. *subcordata* J. F. Macbride, Contr. Gray Herb. No. 48: 7. 1916.) Closely resembling the typical species; cauline leaves sometimes slightly subcordate, and herbage in age often nearly glabrous; calyx-lobes 2.5–4 mm. long, broadly lanceolate to triangular or oblong, usually obtuse. Moist places, Humid Transition Zone; Clatsop and Multnomah Counties south to Coos and Douglas Counties, Oregon. Type locality: "Umpqua Valley at Roseburg, Oregon."

4. *Mertensia ciliata* (James) G. Don. Ciliate Lungwort. Fig. 4193.

Pulmonaria ciliata James ex Torr. Ann. Lyc. N.Y. 2: 224. 1828.

Mertensia ciliata G. Don, Gen. Hist. Pl. 4: 372. 1838.

Stems erect or ascending, 1–10 dm. high, usually several from the stout branching rootstock. Basal leaves oblong to ovate or lanceolate, subcordate at base, 4–15 cm. long, ciliate on the margins, often papillate on the upper surface, petioles longer or shorter than the blades; stem-leaves lanceolate to ovate, acute to acuminate at apex, attenuate or subcordate at base, the lower short-petiolate, the upper sessile; inflorescence becoming lax in age; calyx-lobes 1.5–3 mm. long, obtuse or acutish, ciliate or papillate on the margins otherwise glabrous; corolla-tube 6–8 mm. long, glabrous or with crisped hairs within, the limb about equaling the tube, sometimes a little longer, only slightly expanded; anthers 1–2.5 mm. long; style as long or slightly longer than the corolla; nutlets rugose or mammillate.

Moist meadows or stream banks, mainly Canadian Zone; Idaho and Montana south to Utah and Nevada; reaching the Pacific States only in eastern Oregon, where it occurs in the mountains east of Prairie City, Grant County, and in Steen Mountains, Harney County. Type locality: "along streams within the Rocky Mts." Collected by James. May–June.

Mertensia ciliata var. *stomatechoides* (Kell.) Jepson, Man. Fl. Pl. Calif. 842. 1925. (*Mertensia stomatechoides* Kell. Proc. Calif. Acad. 2: 148. 1863.) Leaves generally narrower, those of the stem mostly oblong- to linear-lanceolate; calyx-lobes 2.5–6 mm. long; style commonly well exceeding the corolla. Gearhart, Warner, and Steen Mountains, southern Oregon, south to western Nevada and in the Sierra Nevada to Tulare County, California. Type locality: headwater of Carson River, Sierra Nevada, California.

5. *Mertensia umbrátilis* Greenm. Shade Lungwort. Fig. 4194.

Mertensia umbratilis Greenm. Erythea 7: 118. 1899.

Mertensia infirma Piper, Contr. U.S. Nat. Herb. 11: 476. 1906.

Mertensia ambigua Piper, op. cit. 477.

Stems erect or ascending, 2–5 dm. high, 1 to several from the stout, simple or few-branched rootstock. Lowest leaves obovate-spatulate, 16–20 cm. long, tapering to a winged petiole nearly equal in length to the blade and sheathing at base; upper stem-leaves short-petiolate to sessile, oblong-lanceolate, 4–10 cm. long; glabrous to hirsute in the upper surface, glabrous or rarely pubescent on the lower, ciliate on the margin; inflorescence rather congested at the apex, not becoming lax in age; calyx 3–8 mm. long, the lobes lanceolate, acute, ciliate on the margins, otherwise glabrous; corolla-tube 7–14 mm., mostly about 10 mm. long, glabrous within, the limb 5–9 mm. long, moderately expanded; anthers 1.5–2.5 mm. long; crests prominent; style about equaling to slightly exceeding the corolla; nutlets 4 mm. long, rugose.

Mostly on rocky slopes, especially in sagebrush areas, Arid Transition Zone; Chelan and Kittitas Counties, Washington, to Crook and Union Counties, Oregon. Type locality: "on dry mountains near Sparta, Union County, Oregon." April–June.

6. *Mertensia oblongifolia* (Nutt.) G. Don. Leafy Lungwort. Fig. 4195.

Pulmonaria oblongifolia Nutt. Journ. Acad. Phila. 7: 43. 1834.

Mertensia oblongifolia G. Don, Gen. Hist. Pl. 4: 372. 1838.

Mertensia nutans subsp. *subclava* Piper, Contr. U.S. Nat. Herb. 11: 479. 1906.

Mertensia foliosa var. *subclava* J. F. Macbride, Contr. Gray Herb. No. 48: 18. 1916.

Stems 1 to several from the simple or branched crown of an elongated rootstock, erect or ascending, 1–3 dm. high. Basal leaves oblong to oblong-ovate or sometimes spatulate, 3–8 cm. long, strigose on the upper surface, glabrous beneath; petiole usually longer than the blade; cauline leaves sessile or the lower short-petiolate, linear to oblong-elliptic, 2–8 cm. long; inflorescence at first congested becoming loosely paniced in age; calyx 3–7 mm. long, divided almost to the base, the lobes linear to linear-lanceolate, acute, ciliate on the margins, otherwise glabrous or nearly so; corolla-tube 5–12 mm. long, glabrous within or rarely with a few scattered hairs; limb 4–7 mm. long; anthers 2 mm. or less in length, oblong; styles included; nutlets rugose.

Moist slopes and meadows, Arid Transition and Canadian Zones; Yakima County, eastern Washington east to Montana, south to Lake and Harney Counties, Oregon and Elko County, Nevada. Rarely collected in the Pacific States. Type locality: "sources of the Columbia River." Collected by Wyeth. April–July.

Mertensia oblongifolia var. *nevadensis* (A. Nels.) L. O. Williams, Ann. Mo. Bot. Gard. 24: 125. 1937. (*Mertensia foliosa* A. Nels. Bull. Torrey Club 26: 243. 1899; *M. nutans* Howell, Fl. N.W. Amer. 491. 1901; *M. nevadensis* A. Nels. Proc. Biol. Soc. Wash. 17: 96. 1904; *M. praecox* Smiley ex J. F. Macbride, Contr. Gray Herb. No. 48: 10. 1916; *M. foliosa* var. *nevadensis* J. F. Macbride, op. cit. 19.) Differs chiefly from the species by both surfaces of the leaves being glabrous on the upper surface, sometimes pustulate and rarely the pustules near the apex of the leaf producing minute mucros. This is the common representative of the species in the Pacific States; ranging along the eastern edge of the Cascades of Washington from Chelan County to Klickitat County and southward to the east side of the Sierra Nevada, Sierra County, California, eastward to Montana, Wyoming, and Utah. Type locality: "Hunter Creek Canyon, near Reno, Nevada."

Mertensia oblongifolia var. *amoëna* (A. Nels.) L. O. Williams, Ann. Mo. Bot. Gard. 24: 130. 1937. (*Mertensia amoëna* A. Nels. Bot. Gaz. 30: 195. 1900; *M. cusickii* Piper, Bull. Torrey Club 29: 643. 1902; *M. pubescens* Piper, Contr. U.S. Nat. Herb. 11: 479. 1906; *M. Bakeri amoëna* A. Nels. in Coulter & Nels. Man. Bot. Rocky Mts. 422. 1909.) Similar to the species but often taller; leaves more or less densely villous-pubescent on both sides. Moist slopes, east of the Cascades, Washington, south in the Pacific States to the Warner Mountains, Modoc County, California, and Steen Mountains, Harney County, Oregon (type locality for *M. cusickii*), east to Montana, Wyoming, Nevada, and Utah. Type locality: among sagebrush on moist slope, Monida, Madison County, Montana.

7. *Mertensia longiflora* Greene. Long-flowered Lungwort. Fig. 4196.

Mertensia longiflora Greene, Pittonia 3: 261. 1898.

Mertensia pulchella Piper, Contr. U.S. Nat. Herb. 11: 478. 1906.

Mertensia Horneri Piper, op. cit. 479.

Mertensia longiflora var. *pulchella* J. F. Macbride, Contr. Gray Herb. No. 48: 17. 1916.

Stems 1 or sometimes 2 or 3 from a shallow tuberous root, slender, 1–2.5 dm. high, including subterranean part. Basal leaves seldom developed on roots producing flowering stems, oval to spatulate, 2–5 cm. long, on winged petioles, those at the base of flowering stems usually reduced to linear scarious bracts; cauline leaves oblong-lanceolate or -oblanceolate to broadly oval, 2–8 cm. long, obtuse, glabrous to strigose or hirsute above, glabrous beneath; inflorescence often congested, the pedicels short, 1–6 mm. long; calyx-lobes lanceolate to linear-lanceolate, 3–5 mm. long, ciliate on the margins, otherwise glabrous; corolla-tube 8–15 mm. long, glabrous within or with a few scattering hairs near the base; limb usually much shorter than the tube; anthers 1–1.5 mm. long, filaments about as broad as the anthers; style about equaling or somewhat exceeding the corolla; nutlets 3–4 mm. long, rugose.

Moist basaltic or sandy soils, Arid Transition and Canadian Zones; Chelan and Stevens Counties, Washington, south to Klamath County and Wallawa and Blue Mountains, Oregon, and Modoc County, northeastern California; extending beyond our range to eastern British Columbia, Idaho, and western Montana. Type locality: "Collected in eastern Washington [Medical Lake] in May, 1893, by Messrs. Sandberg and Leiberg." April–June.

12. LITHOSPÉRMUM [Tourn.] L. Sp. Pl. 132. 1753.

Annual or perennial, pubescent, hirsute or hispid herbs, with alternate leaves, and small white, yellow or blue flowers in leafy-bracted spikes or racemes. Calyx 5-parted



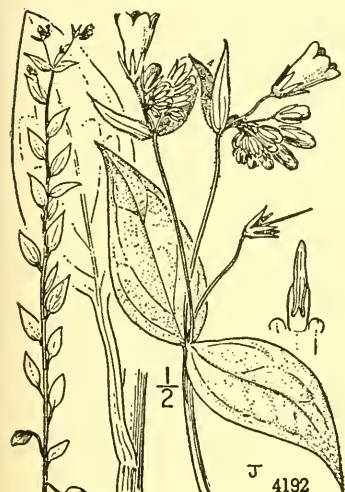
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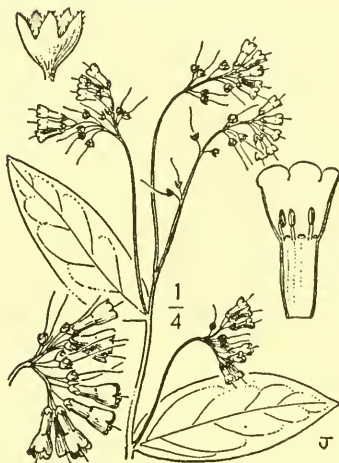
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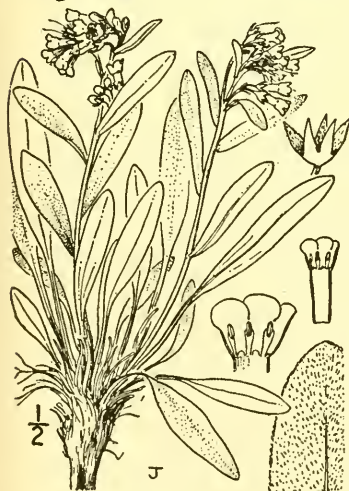
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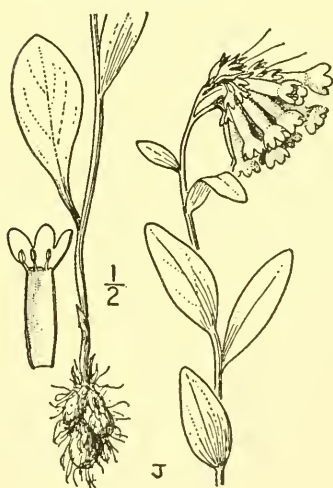
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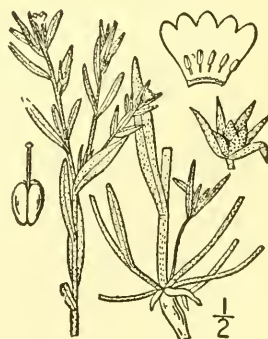
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4196



4197

4189. *Myosotis versicolor*
4190. *Mertensia bella*
4191. *Mertensia paniculata*

4192. *Mertensia platyphylla*
4193. *Mertensia ciliata*
4194. *Mertensia umbratilis*

4195. *Mertensia oblongifolia*
4196. *Mertensia longiflora*
4197. *Lithospermum arvense*

or 5-cleft into narrow segments or lobes. Corolla funnelform or salverform, 5-lobed, the throat naked, pubescent or crested, lobes entire or erose-denticulate, tube sometimes pubescent at the base within. Stamens 5, included, inserted on the throat of the corolla; filaments short. Ovary 4-divided; style slender or filiform; stigma capitate or 2-lobed. Nutlets 4 or fewer, erect, attached by their bases to the nearly flat receptacle; scar of attachment not concave. [Name Greek, meaning stone and seed.]

A genus of about 40 species, natives mainly of the northern hemisphere, a few in South America and Africa. Type species, *Lithospermum officinale* L.

Annual; nutlets densely tuberculate and dull.

1. *L. arvense*.

Perennial, stems several from a stout often purplish root; nutlets smooth and polished, whitish.

Corolla greenish yellow, its tube about equaling the calyx-lobes; upper leaves crowded, narrowly linear-lanceolate, attenuate at apex.

2. *L. ruderale*.

Corolla golden yellow, its tube well exceeding calyx-lobes; upper leaves not crowded, elliptic-ovate to ovate-lanceolate, obtuse or acute at apex.

3. *L. californicum*.

1. *Lithospermum arvense* L. Corn Gromwell. Fig. 4197.

Lithospermum arvense L. Sp. Pl. 132. 1753.

Annual, appressed-pubescent, the stem erect, usually branched, 1.5–5 dm. high. Leaves narrowly lanceolate to nearly linear, sessile, mostly appressed, 2–2.5 cm. long, 3–5 mm. wide, obtuse or acutish at apex; flowers white, sessile or nearly so in terminal spikes, becoming distinct in age; corolla about 6 mm. long; calyx-segments equaling or slightly exceeding the corolla-tube; nutlets brown, wrinkled and pitted, about 2 mm. long; convex on the dorsal side, keeled on the inner side.

Grassy hillsides and grain fields, naturalized from Europe; Kittitas and Spokane Counties, Washington; Multnomah County, Oregon. May–July.

2. *Lithospermum ruderale* Dougl. Western Gromwell or Columbia Puccoon. Fig. 4198.

Lithospermum ruderale Dougl. ex. Lehm. Stirp. Pug. 2: 28. 1830.

Lithospermum pilosum Nutt. Journ. Acad. Phila. 7: 43. 1834.

Lithospermum Torreyi Nutt. op. cit. 44.

Lithospermum laxum Greene, Pittonia 3: 263. 1898.

Lithospermum ruderale var. *lanceolatum* A. Nels. Bot. Gaz. 52: 272. 1911.

Stems usually several from a large root, erect or decumbent, rather stout, 2–5 dm. high, simple or branched, hirsute and somewhat hispid to densely villous. Leaves numerous, usually crowded above, mostly ascending or sometimes reflexed, linear-lanceolate to lanceolate, 3–8 cm. long, 2–12 mm. wide, softly to rather harshly pubescent on both sides, scabrous on the margins; flowers in the axils of the upper leaves; pedicels stout, 1–3 mm. long; calyx-lobes in fruit subulate, 7–10 mm. long; corolla pale, often greenish yellow, 9–12 mm. long, tube broad, scarcely dilated at the throat, lobes about 3 mm. long; nutlets broadly ovoid, 5–6 mm. long, usually abruptly attenuate at apex into a stout beak, whitish, smooth and highly polished.

Dry plains and hillsides, Arid Transition Zone; British Columbia south in the Pacific States east of the Cascade Mountains of Washington and Oregon to Placer County, California, east to Alberta, Montana, and Colorado. Type locality: "gravelly banks of the Columbia and Multnomah [Willamette] Rivers." April–June.

3. *Lithospermum californicum* A. Gray. California Gromwell or Shasta Puccoon. Fig. 4199.

Lithospermum californicum A. Gray, Proc. Amer. Acad. 10: 51. 1874.

Lithospermum ruderale var. *californicum* Jepson, Man. Fl. Pl. Calif. 843. 1925.

Stems usually several from a stout root, erect or ascending, 12–45 cm. high, spreading-hirsute. Leaves variable, the lower linear-lanceolate to narrowly lanceolate and shorter than the upper, these not congested at the summit of the stem, oblong-lanceolate to ovate, appressed-pubescent with ascending rather harsh hairs, especially on the upper surface, lateral veins usually evident; stem usually branched and forming a panicle inflorescence; corolla golden yellow, 12–18 mm. long, the slender tube dilated into the throat, twice as long as the calyx, limb 8 mm. broad; fruiting calyx-lobes 7–10 mm. long, linear-lanceolate; nutlets broadly ovoid, short-beaked, whitish, smooth and polished.

Dry rocky slopes and ridges, Arid Transition Zone; Siskiyou Mountains, Josephine and Jackson Counties, Oregon, south to Del Norte and Placer Counties, California. Type locality: Grass Valley, Nevada County, California. April–June.

Echium plantagineum L. Mant. 2: 202. 1771. Stems erect, solitary or several from a biennial root, 3–6 dm. high, villous-hirsute, hairs pustulate at base, spreading or more or less appressed. Upper leaves lanceolate or linear-lanceolate, sessile or clasping, the basal narrowly oblanceolate, tapering to a petiole about as long as or shorter than the blades, bristly hirsute with rather short appressed hairs more or less pustulate at base; flowers mostly bracteate, in racemously arranged scorpioid racemes; pedicels short; calyx-lobes lanceolate-acuminate, about 10 mm. long in fruit, much longer than the tube; corolla blue, 15–20 mm. long, irregular with a campanulate throat and oblique limb, lobes unequal; stamens exserted; nutlets 4, erect, wrinkled. Adventive in California; Carmel, Monterey County, and De Luz, San Diego County.

13. *LÁPPULA* [Rivin.] Moench, Meth. 416. 1794.

Annual herbs with linear or oblong leaves. Flowers in panicle leafy-bracted



4198

4198. *Lithospermum ruderales*

4200

4199. *Lithospermum californicum*

4199

4200. *Lappula echinata*

racemes, pedicels erect in fruit. Corolla blue or white, salverform, small, tube short, closed by 5 scales, lobes obtuse, spreading. Stamens included; filaments very short. Ovary 4-lobed; style short. Nutlets 4, erect or incurved, attached all along their ventral keel to a subulate gynobase. [Name Latin, meaning a bur.]

About 14 species, native mostly of the north temperate regions. Type species, *Myosotis Lappula* L.

Marginal spines of the achenes in 2 rows, slender, not confluent at base.
Marginal spines in 1 row, the bases often more or less confluent.

1. *L. echinata*.
2. *L. Redowskii*.

1. *Lappula echinata* Gilib. European Stickseed. Fig. 4200.

Myosotis Lappula L. Sp. Pl. 131. 1753.

Lappula echinata Gilib. Fl. Lithuan. 1: 25. 1781.

Lappula Myosotis Moench, Meth. 417. 1794.

Echinosperrum Lappula Lehm. Asperif. 121. 1818.

Lappula Lappula Karst. Deutsch. Fl. 979. 1880-1883.

Annual, with erect, simple to freely branched stem, 1.5-6 dm. high, villous-hirsute with upwardly more or less appressed hairs. Lower leaves narrowly oblanceolate, the others linear-sessile, ascending, 2.5-5 cm. long, appressed villous-hirsute, passing into the bracts of the racemes; pedicels 1-3 mm. long; calyx-lobes linear, spreading and 2.5-3 mm. long in fruit; corolla blue, tube surpassing the calyx, limb 3-4 mm. wide; nutlets 3.5-4 mm. long, strongly muricate-prickly dorsally, prickles in 2 rows on the margin, long and slender, not confluent at base.

Dry plains, hillsides, and fields, Arid Transition and Upper Sonoran Zones; introduced in eastern Washington and eastern Oregon to Idaho, Nevada, and eastward across the continent. Type locality: in Europe. June-Aug.

2. *Lappula Redowskii* (Hornem.) Greene. Western Stickseed. Fig. 4201.

Myosotis Redowskii Hornem. Hort. Hafn. 1: 174. 1813.

Echinosperrum Redowskii Lehm. Asperif. 127. 1818.

Echinosperrum Redowskii var. *occidentale* S. Wats. Bot. King Expl. 246. pl. 23. figs. 9-10. 1871.

Lappula occidentalis Greene, Pittonia 4: 97. 1899.

Annual, the stems simple or few-branched at base and erect or sometimes diffuse, 15-35 cm. high, herbage more or less canescent with a strigose and also villous pubescence. Leaves narrowly linear to narrowly lanceolate or the lower narrowly oblanceolate, 1-3 cm. long; flowers in the axils of small foliaceous bracts, forming open and at length elongated terminal racemes; pedicels 1-2 mm. long; calyx-segments narrowly lanceolate, erect or but little spreading in fruit, a little shorter than the corolla-tube; corolla blue, 3-4 mm. long, conspicuously crested on the throat; nutlets 2-2.5 mm. long, bordered by a single row of barbed prickles, the prickles distinct at base or joined by a narrow margin, the dorsal area of nutlets above the prickles ovate, distinctly tuberculate.

Dry hillsides and valleys, mainly Arid Transition and Upper Sonoran Zones; British Columbia southward east of the Cascade Mountains and Sierra Nevada to the San Bernardino Mountains, California, east to the Dakotas and Texas; also in Eurasia and Argentina. Type locality: in Asia. April-July.

Lappula Redowskii var. *cupulata* (A. Gray) M. E. Jones, Bull. Univ. Montana No. 15. 44. 1910. (*Echinosperrum Redowskii* var. *cupulatum* A. Gray, Bot. Calif. 1: 530. 1876; *Lappula cupulata* Rydb. Bull. Torrey Club 28: 31. 1901; *L. texana* var. *columbiana* (A. Nels.) I. M. Johnston, Contr. Gray Herb. No. 70: 50. 1924; *L. Redowskii* var. *desertorum* (Greene) I. M. Johnston, Contr. Arnold Arb. No. 3: 93. 1932.) Dis-

tinguished from the typical species by having the marginal prickles confluent at least to about the middle, forming a cup-like margin. Southeastern Washington southward east of the Cascade-Sierra Divide to the deserts of southern California, eastward to Montana, Wyoming, and New Mexico. Type locality: "Dry plains, along the eastern side of the Sierra Nevada (Watson, etc.)." Watson's specimens, which Western botanists generally have taken as the type, were from the Trinity Mountains, Nevada.

14. *HACKELIA** Opiz in Bercht. Oekon. Fl. Böhm. 2: 146. 1838.

Biennial or perennial usually rather tall herbs with linear or oblong leaves. Inflorescence naked or bracteate at the branches of the panicle; pedicels recurved or deflexed in fruit. Calyx 5-parted, spreading or reflexed in fruit. Corolla blue, pinkish or white, the throat prominently crested. Style shorter than the nutlets. Nutlets beset with glochidiate bristles, attached below the middle to the broadly pyramidal gynobase by a large, oblique, ovate or deltoid areola, ventral keel extending over only upper half of nutlet. [Named in honor of P. Hackel, a German professor of agriculture.]

A genus of about 35 species, of wide geographical distribution, but mostly in the north temperate regions. Type species, *Hackelia deflexa* Opiz.

Racemes several to many, paniculately disposed, bracteate.

Annuals; mature nutlets 2-3.5 mm. long.

1. *H. deflexa americana*.

Perennials; mature nutlets 4-8 mm. long.

Dorsal surface of the nutlet without barbed prickles or bearing few to several, these shorter than the marginal ones which are flattened at the base and form a conspicuous border to the nutlet.

Marginal prickles distinct or united only at the base.

Corolla 5-7 mm. broad.

Branches of inflorescence rather strict, numerous, many-flowered; plants 5-10 dm. high, rather coarse.

2. *H. floribunda*.

Branches of the inflorescence open, spreading, with fewer branches and flowers; plants 3-6 dm. high.

Nutlets broadly ovate; basal leaves few, stems leafy above, the leaves not conspicuously reduced in size.

3. *H. Jessicae*.

Nutlets narrowly ovate; basal leaves many, stem-leaves few, reduced in size.

4. *H. Cusickii*.

Corolla 8-18 mm. broad (sometimes less in *arida*).

Corolla blue.

Herbage short-tomentose, mostly appressed; corolla 8-10 mm. broad.

5. *H. amethystina*.

Herbage bristly hirsute; corolla 12-15 mm. broad.

6. *H. setosa*.

Corolla white (sometimes pale blue in *diffusa*).

Leaves oblanceolate to ovate-lanceolate.

Corolla 8-12 mm. broad; herbage soft-hirsute.

7. *H. diffusa*.

Corolla 12-18 mm. broad; herbage strigillose-tomentose.

8. *H. bella*.

Leaves linear-lanceolate to linear.

9. *H. arida*.

Marginal prickles united one-third to one-half their length, usually rolled inward to form a cup-like margin to the nutlet.

Corolla large, 12-20 mm. broad.

Herbage strigose-pubescent with intermingling spreading hairs; leaves linear to linear-lanceolate; flowers blue.

10. *H. ciliata*.

Herbage hispid; leaves oblong-spatulate to oblanceolate; flowers white.

11. *H. venusta*.

Corolla small, 4-10 mm. broad, white.

Corolla-appendages hairy; pedicels longer than the mature fruit.

12. *H. cinerea*.

Corolla-appendages smooth; pedicels equaling or shorter than the mature fruit.

13. *H. hispida*.

Dorsal surface of the nutlet evenly beset with barbed prickles, these not strongly flattened to form a conspicuous border to the nutlet.

Corolla rotate; corolla-tube not or but little exceeding the calyx.

Corolla 6-10 mm. broad, white; prickles stout, up to 2.5 mm. long; surface of the nutlet dull, conspicuously muriculate.

14. *H. californica*.

Corolla 12-18 mm. broad, pink fading blue; prickles slender, up to 5 mm. long; surface of the nutlet shining, smooth.

15. *H. mundula*.

Corolla short-salverform, the tube well surpassing the calyx.

Corolla 12-20 mm. broad; corolla-appendages large, about one-third as long as the corolla-lobes, pubescence velvety.

16. *H. velutina*.

Corolla 6-8 mm. broad, about one-sixth as long as the corolla-lobes, pubescence not velvety.

17. *H. nervosa*.

Racemes 1-3, terminal, umbel-like, not bracteate.

18. *H. Sharsmithii*.

1. *Hackelia deflexa* var. *americana* (A. Gray) Fernald & Jtn. Nodding Stickseed. Fig. 4202.

Echinosperrum deflexum var. *americanum* A. Gray, Proc. Amer. Acad. 17: 244. 1882.

Lappula deflexa var. *americana* Greene, Pittonia 2: 183. 1891.

Lappula americana Rydb. Bull. Torrey Club 24: 294. 1897.

Hackelia deflexa var. *americana* Fernald & Jtn. Rhodora 26: 124. 1924.

Slender-stemmed annual 6-10 dm. high, herbage green, the rough, sparse puberulence spreading or appressed, hairs somewhat enlarged at base. Leaves oblong-lanceolate to lanceolate, petioled, 6-10 cm. long, length of petiole reduced on the upper leaves, these becoming sessile;

* Text contributed by Roxana Stinchfield Ferris.

inflorescence of slender lax racemes, many-flowered, pedicels slender, 6–9 mm. in fruit; calyx 1.5–2 mm. long; corolla blue or whitish, about 3 mm. broad, appendages broader than long, scarcely retuse, protuberances not closing throat, very finely papillose; face of nutlet narrowly ovate, scarcely 2 mm. long, muricate and sparsely hispidulous, occasionally with 2 or 3 short prickles, the marginal glochidiate prickles 10–12 on each side, broadened at base, some short but approximately equal length, the longest equaling the width of the nutlet.

Wooded slopes and thickets, Transition Zones; British Columbia south to Okanogan County, Washington, and east to Ontario and Michigan and Iowa. Type locality: not given. June–July.

2. *Hackelia floribunda* (Lehm.) I. M. Johnston. Many-flowered Stickseed. Fig. 4203.

Echinosperrum floribundum Lehm. Stirp. Pug. 2: 24. 1830.

Lappula floribunda Greene, Pittonia 2: 182. 1891.

Hackelia floribunda I. M. Johnston, Contr. Gray Herb. No. 68: 46. 1943.

Stem erect, stout from a short-lived perennial root, 5–12 dm. high, the rough pubescence deflexed, mixed with some spreading hairs. Leaves oblanceolate to lanceolate, hirsutulous-appressed, basal leaves petiolate with spreading hairs, the stem-leaves sessile above; racemes of the inflorescence many, rather strict, densely flowered, pedicels short, about 5–7 mm. long in fruit; corolla blue, 5–7 mm. broad, appendages small, obscurely papillate, not closing the throat; face of nutlet with a median ridge, muriculate, hirsutulous, without short glochidiate prickles, the marginal spines much flattened at base, distinct or somewhat confluent, 4–6 on each side, mostly exceeding in width the face of the nutlet.

Brushy slopes and borders of woods, Transition and Canadian Zones; British Columbia and Washington and Oregon east of the Cascade Mountains to Mono County, California; also western Ontario and Minnesota to northern New Mexico and Arizona. Type locality: "Lake Pentanguishene to the Rocky Mountains. *Drummond*," according to Lehmann in Hooker, Fl. Bor. Amer. 2: 84. 1838. June–July.

3. *Hackelia Jéssicae* (McGregor) Brand. Jessica's Stickseed. Fig. 4204.

Lappula micrantha Eastw. Bull. Torrey Club 30: 497. 1903. Not *Hackelia micrantha* Opiz.

Lappula Jéssicae McGregor, Bull. Torrey Club 37: 262. 1910.

Hackelia Eastwoodiae I. M. Johnston, Contr. Gray Herb. No. 68: 47. 1923.

Hackelia Jéssicae Brand, Pflanzenreich 4²⁵²: 132. 1931.

Lappula floribunda var. *Jéssicae* Jepson & Hoover in Jepson, Fl. Calif. 3: 307. 1943.

Stems erect or ascending, from a stout root, sparsely to rather densely villous-hirsute. Basal leaves 8–15 cm. long, the blades oblanceolate, 15–20 mm. wide, narrowed to a winged petiole of about equal length; upper stem-leaves sessile, lanceolate, acute, the reduced ones subtending the lower racemes often ovate-lanceolate; racemes several in an open panicle; pedicels slender, at length recurved-reflexed, 5–10 mm. long; calyx-lobes oblong to oblong-lanceolate, 2–3 mm. long; corolla small, pale blue, 3.5–5 mm. broad, tube often whitish, 1.5–2 mm. long, lobes oblong-obovate, crests yellowish, rounded, puberulent; nutlets 4–6 mm. long, marginal prickles broadly dilated at base, about 10, distinct, often with a shorter one in between, dorsal face broadly ovate, usually flattened with an indistinct median ridge, puberulent and in age more or less muriculate, usually with 1 or more short barbed prickles near the center.

Usually on moist banks or slopes, Canadian Zone; British Columbia, Washington and Idaho south to North Coast Ranges and the Sierra Nevada, California, and western Nevada. A variable species apparently intergrading with *H. Cusickii*, a species to which it is allied. Type locality: Halfmoon Lake, Eldorado County, California. June–August.

4. *Hackelia Cusickii* (Piper) Brand. Cusick's Stickseed. Fig. 4205.

Lappula Cusickii Piper, Bull. Torrey Club 29: 542. 1902.

Lappula arida var. *Cusickii* Nels. & Macbr. Bot. Gaz 61: 41. 1916.

Hackelia arida var. *Cusickii* I. M. Johnston, Contr. Gray Herb. No. 68: 48. 1923.

Hackelia Cusickii Brand, Pflanzenreich 4²⁵²: 131. 1931.

Perennial, stems erect or ascending, 15–30 cm. high, crown of the woody caudex usually thickly clothed with old leaf-bases, whole plant bluish-canescens with rather densely appressed puberulence. Lower leaves many, linear-lanceolate or narrowly oblanceolate, 4–10 mm. wide, acute, more or less hirsute-ciliate on the elongated petioles, upper stem-leaves sessile and much shorter, ciliate on the margin of the blade at base; inflorescence racemose-corymbose, with about 5 branches; calyx-lobes linear, acute, 2 mm. long; corolla blue, 5–6 mm. broad, appendages short-pilose, about as long as broad, emarginate; nutlets narrowly ovate, 4–5 mm. long, their marginal prickles a little shorter than the width of the nutlet, 3–5 broad-based long prickles on each side with much shorter slender prickles in between, all somewhat united at base; dorsal face of nutlet with a faint central ridge, densely muriculate and with a few irregularly dispersed short slender barbed prickles.

Dry slopes, often among junipers, mainly Arid Transition Zone; eastern Oregon from Gilliam County to Klamath and Malheur Counties, and to Modoc County, California. Type locality: "Logan Mountains, eastern Oregon, 6500 feet altitude, in the shelter of juniper." May–July.

Hackelia saxatilis (Piper) Brand, Pflanzenreich 4²⁵²: 133. 1931. (*Lappula saxatilis* Piper, Bull. Torrey Club 29: 541. 1902.) Stems rather slender, 2–3 dm. high, herbage thinly cinereous throughout with a fine soft spreading and reflexed pubescence and occasional longer villous hairs intermixed, especially on the petioles of the lower leaves and on the margins of the upper ones. Lower leaves oblanceolate, acute, with petioles about as long as the blades; upper leaves linear-lanceolate, sessile; branches of the spreading inflorescence 6–10-flowered; corolla blue, rotate, about 7 mm. broad; appendages pubescent, broader than long; nutlets 3–4 mm.

long, 3-5 long glochidiate prickles on each side with 1-3 short prickles between, all slightly united at base; dorsal surface muriculate, bearing a few short glochidiate bristles. Rocky sides of canyons, Klickitat River, Klickitat County, Washington. Known only from the type locality.

Hackelia patens (Nutt.) I. M. Johnston, Journ. Arnold Arb. 16: 194. 1935. (*Rochelia patens* Nutt. Journ. Acad. Phila. 7: 44. 1834; *Lappula coerulescens* Rydb. Mem. N.Y. Bot. Gard. 1: 328. 1900; *L. coerulescens* var. *brevicula* Jepson, Fl. Calif. 3: 307. 1943.) Stems 2 or 3, short, deflexed-hirsute, with some hairs spreading, arising from a woody caudex covered with old leaf-bases; basal leaves many, oblanceolate to lanceolate, stem-leaves reduced upwards, pubescence rather dense, short, appressed; branches of the inflorescence 5-10-flowered, pedicels short, elongating somewhat in fruit; corolla blue or whitish, small, appendages somewhat broader than long, obscurely papillose; nutlets small, marginal glochidiate prickles 3-5 on each side, a few short prickles interspersed, the longest prickles surpassing the body of the nutlet; face of the nutlet with a faint median ridge, muriculate and occasionally bearing 1 or 2 short prickles. Western Montana and Idaho to Utah and Nevada. In California but one specimen (Jepson, Poison Creek, White Mountains, Inyo County), the type of *L. coerulescens* var. *brevicula*, has been seen. Until more material is available it seems best to assign it to the species above, to which it is closely related. Type locality: "near the Flat-Head River." Collected by Wyeth.

5. *Hackelia amethystina* J. T. Howell. Howell's Stickseed. Fig. 4206.

Hackelia amethystina J. T. Howell in Eastw. Leaflets West. Bot. 3: 125. 1942.

Stems stout, erect, 5-8 dm. high, greenish, more or less short-canescens with appressed or spreading hairs. Basal leaves petioled, narrowly elliptic, about 10 cm. long, acute at apex, stem-leaves sessile and subclasping, lanceolate to ovate; inflorescence short-canescens, 15-25 cm. long, bracts broadly ovate, pedicels slender, about 1 cm. long in fruit; corolla blue, 9-10 mm. broad, appendages subquadrate, papillose, conspicuous; nutlets 5-6 mm. long, dorsal face broadly ovate, hirsutulous, faintly muriculate, with 6-10 very short prickles, the marginal glochidiate prickles slender, bluish in age, somewhat dilated at base, free or a little united, 9-13 on each side, to 5 mm. long but of varying lengths.

Wooded slopes, Transition Zones; Tehama and Glenn Counties to eastern Mendocino County, California. Type locality: Log Spring Ridge between Log Spring and Government Flat, Tehama County. May-July.



6. *Hackelia setosa* (Piper) I. M. Johnston. Bristly Stickseed. Fig. 4207.

Lappula setosa Piper, Bull. Torrey Club 29: 544. 1902.

Hackelia setosa I. M. Johnston, Contr. Gray Herb. No. 68: 46. 1923.

Stems 1 to several from the often-branched crown of the woody root, 3-6 dm. high, plant bristly-hirsute throughout without any finer pubescence. Basal leaves linear-oblancoate, acutish to obtuse, 6-10 cm. long, blade and petiole of about equal length; cauline leaves sessile or nearly so, linear to linear-lanceolate, gradually reduced above and passing into the bracts of the inflorescence; calyx-lobes oblong-linear, obtuse, 3-4 mm. long, hispid; corolla bright to light blue, 12-15 mm. broad, the tube not exceeding the calyx; appendages semicircular, short-pilose, protuberance small; nutlets 5 mm. long, the long and alternating short marginal prickles confluent at the bases to form a narrow wing, dorsal surface nearly plane, minutely muriculate bearing several short barbed bristles.

Open woods or brushy openings in forests, Canadian and Transition Zones; Siskiyou Mountains, southwestern Oregon, to Humboldt and northern Lake Counties in North Coast Ranges and to Sierra County in the Sierra Nevada, California. Type locality: Sierra Valley, Plumas County, California. June-July.

7. *Hackelia diffusa* (Lehm.) Greene. Diffuse Stickseed. Fig. 4208.

Echinosperrum diffusum Lehm. Stirp. Pug. 2: 23. 1830.

Lappula diffusa Greene, Pittonia 2: 182. 1891.

Lappula Hendersonii Piper, Bull. Torrey Club 29: 529. 1902.

Hackelia diffusa I. M. Johnston, Contr. Gray Herb. No. 68: 48. 1923.

Stems usually several or many from a large root, diffusely spreading, 3-7 dm. long, soft-hirsute. Lower leaves oblanceolate, tapering into a margined petiole, 8-15 cm. long, upper oblong, sessile, gradually smaller above, the uppermost becoming bract-like; racemes paniculate; corolla rotate, white varying to blue, 8-12 mm. broad, appendages puberulent; fruiting pedicels deflexed, about 5 mm. long; nutlets about 5 mm. long, marginal prickles subulate, very flat, as long as the width of the nutlet or nearly so; dorsal surface of nutlet narrowly ovate, muriculate, bearing numerous short barbed prickles.

Shady cliffs and moist rocky ground, Transition and Canadian Zones; British Columbia south on the eastern slope of the Cascade Mountains in Yakima and Klickitat Counties, Washington, and Wasco and Sherman Counties, Oregon. Type locality: "N.W. America." Collected by Douglas. May-July.

8. *Hackelia bella* (J. F. Macbride) I. M. Johnston. Showy Stickseed. Fig. 4209.

Lappula bella J. F. Macbride, Contr. Gray Herb. No. 48: 39. 1916.

Lappula Rattanii Brand, Rep. Spec. Nov. 18: 311. 1922.

Hackelia bella I. M. Johnston, Contr. Gray Herb. No. 68: 47. 1923.

Hackelia Rattanii Brand, Pflanzenreich 422: 129. 1931.

Perennial, stems erect or ascending, 5-6 dm. high, rather densely strigillose above, retrorsely so below. Basal leaves oblanceolate, 10-15 cm. long, 1-2 cm. wide, narrowed below to a petiole nearly as long, rather densely strigillose-tomentose; upper stem-leaves broadly lanceolate-ovate to oblong, sessile and subcordate-clasping at base; inflorescence open; pedicels becoming reflexed, the longer 10-15 mm. long; calyx-lobes oblong to oblong-ovate, 4-6 mm. long in fruit; corolla white, tube about 4 mm. long, limb 12-18 mm. broad, appendages pubescent; nutlets ovoid, 6-7 mm. long; dorsal face muriculate and with a few scattering short obscurely barbed prickles, marginal prickles in a single row, long, slender, broadened at base and sometimes slightly united into a narrow wing.

Open slopes, Canadian Zone; Coast Ranges from southern Siskiyou County to Mendocino County, California. Type locality: Dorleska, Salmon Mountains, Trinity County, in the Canadian Zone, at an altitude of 2,000 meters. June-Aug.

9. *Hackelia árida* (Piper) I. M. Johnston. Sagebrush Stickseed. Fig. 4210.

Lappula árida Piper, Bull. Torrey Club 28: 44. 1901.

Hackelia árida I. M. Johnston, Contr. Gray Herb. No. 68: 48. 1923.

Lappula Cottonii Piper, Bull. Torrey Club 29: 549. 1902.

Stems erect, 3-5 dm. high, branched above, canescently hirsute throughout with mostly appressed hairs. Basal leaves linear to narrowly lanceolate, acute, attenuate into the petiole, 8-20 cm. long, 5-8 mm. wide; stem-leaves linear, 4-12 cm. long, 5 mm. wide, sessile by a broad base, more or less hirsute-ciliate; racemes 5-10 cm. long, loosely flowered; calyx-lobes linear-oblong, 2 mm. long, very obtuse; corolla white, rotate, 10-12 mm. broad, the fornicies broader than long, obscurely retuse, short-pilose; marginal prickles of nutlets all barbed, united at base, unequal in length, the longer about half as long as the width of the nutlet; dorsal surface muriculate and with 6-10 short barbed bristles centrally placed; inner surface hispidulous or muriculate; scar oblong-ovate, central.

Dry sagebrush plains, Upper Sonoran Zone; eastern Washington from Chelan County to Yakima County east to Spokane County. Type locality: Ellensburg, Klickitat County. May-June.

10. *Hackelia ciliata* (Dougl.) I. M. Johnston. Okanogan Stickseed. Fig. 4211.

Cynoglossum ciliatum Dougl. ex Lehm. Stirp. Pug. 2: 24. 1830.

Echinosperrum ciliatum A. Gray, Proc. Amer. Acad. 17: 225. 1882.

Lappula ciliata Greene, Pittonia 2: 182. 1891.

Hackelia ciliata I. M. Johnston, Contr. Gray Herb. No. 68: 46. 1923.

Stems usually only 1 or 2 from a woody root, erect or ascending, 3-6 dm. high; canescent

with a dense fine pubescence, scattering pointed hirsute hairs intermingling, the finer pubescence appressed above, retrorsely so toward the base. Lower leaves crowded at the base, linear to linear-oblongate, 6–8 cm. long, 4–8 mm. wide, narrowed to petioles one-third to nearly as long as the blades, acute or acuminate; upper leaves linear, sessile, acuminate, 2–3.5 cm. long; inflorescence open, the lower branches often 12–18 cm. long in fruit; pedicels slender, recurved-spreading, the lower 10–15 mm. long; calyx-lobes linear-oblong, mostly acute, 3 mm. long in fruit; corolla blue, the tube equaling the calyx-lobes, limb 12–15 mm. broad; appendages short-pilose, crest suborbicular, retuse at apex; nutlets oblong-ovoid; marginal prickles united about one-third their length, mostly exceeding the width of the nutlet; dorsal surface finely muriculate and puberulent, and with a few very short barbed prickles near the center.

Canyon slopes, in sandy or rocky soils, Arid Transition Zone; northeastern Washington, from Okanogan County to Stevens, Lincoln and Spokane Counties, northward into adjacent British Columbia. Type locality: "Kettle Falls and Spokane River." Collected by Douglas. May–June.

11. *Hackelia venusta* (Piper) St. John. Showy Stickseed. Fig. 4212.

Lappula venusta Piper, Proc. Biol. Soc. Wash. 37: 93. 1924.

Hackelia venusta St. John, Research Stud. St. Coll. Wash. 1: 104. 1929.

Perennial, leafy stems several, erect, ascending, 2–3 dm. high, hirsute or hispid retrorsely so below, upwardly appressed above, the hairs with enlarged bases. Leaves green and hispid on both sides; lower leaves 3–4 cm. long, the blades oblong-spatulate about as long as the winged petiole, 5–10 mm. wide; upper leaves sessile, linear-oblongate, rounded to acutish at apex, 2–4 cm. long; inflorescence loosely cymose in age; bracts of the racemose branches lanceolate to linear; pedicels recurved in age 1–2 cm. long; calyx-lobes linear, acute, 4 mm. long; corolla white, 15–20 mm. broad, tube about equaling the calyx-lobes, lobes orbicular-obovate; appendages yellow, oblong, broadest above, emarginate, minutely roughened; anthers oblong, yellow; nutlets trigonous, 6 mm. long; marginal prickles united at base about one-third their length; dorsal surface convex, sparsely muriculate and with about 10 barbed bristles.

Rocky slopes, Arid Transition Zone; Chelan County, eastern Washington. Type locality: "Between Tumor and Drury, Chelan County." May–July.

12. *Hackelia cinerea* (Piper) I. M. Johnston. Gray Stickseed. Fig. 4213.

Lappula cinerea Piper, Bull. Torrey Club 29: 544. 1902.

Hackelia cinerea I. M. Johnston, Contr. Gray Herb. No. 68: 46. 1923.

Stems erect, 4–6 dm. high, cinereous throughout with appressed pubescence, and with intermingling hispid hairs, some of these, especially on the basal leaves, pustulate at base. Lower leaves linear to linear-oblong, 5–10 cm. long, stem-leaves sessile, reduced upward, obtuse with upper ones acutish; inflorescence loose, the branches mostly 3–5, often 15–20 cm. long, 5–15-flowered; bracts narrowly linear, acute, the uppermost minute or wanting; pedicels slender, recurved-reflexed, the lower often 10–15 mm. long; calyx-lobes linear-lanceolate, acute; corolla white, tube 2 mm. long, lobes obovate-orbicular, 3 mm. long; appendages short-pilose, the crest semiorbicular, marginate at apex; nutlets 3–4 mm. long, marginal prickles united at base for about half their length, rather numerous and of uneven length, often curving outwards; dorsal surface with indistinct medium ridge, muriculate and bearing several short glochidiate bristles.

Dry rocky or gravelly slopes, Arid Transition Zone; Chelan County, eastern Washington, to Idaho, Montana, and Wyoming. Type locality: "Salmon River bluffs, Idaho, altitude 2,500 feet." May–July.

13. *Hackelia hispida* (A. Gray) I. M. Johnston. Rough Stickseed. Fig. 4214.

Echinosperrum hispidum A. Gray, Proc. Amer. Acad. 16: 106. 1881.

Echinosperrum diffusum var. *hispidum* A. Gray, Proc. Amer. Acad. 17: 225. 1882.

Lappula hispida Greene, Pittonia 2: 182. 1891.

Hackelia hispida I. M. Johnston, Contr. Gray Herb. No. 68: 46. 1923.

Stems stout, erect or ascending, 3–5 dm. high, hispid with spreading hairs. Lower stem-leaves oblanceolate, narrowed to a winged petiole, central ones sessile, lanceolate, those subtending the lower branches of the inflorescence broadly lanceolate or ovate-lanceolate, subclasping, all loosely hispid, the hairs conspicuously pustulate at base; inflorescence open; pedicels often shorter than the fruit; calyx-lobes oblong, 2 mm. long; corolla white or greenish, tube barely equaling the calyx-lobes, lobes broadest at base, limb 4–6 mm. broad; appendages smooth, lunate, much broader than long; nutlets about 4 mm. long, marginal prickles united to about their middle and curved outward to form a cup-like border; dorsal surface of nutlet often nearly smooth or in age thinly mucronate-roughened, and often with a few short glochidiate bristles near the center.

Dry rocky slopes, Arid Transition Zone; Douglas County, Washington, to northeastern Oregon. Type locality: Pine Creek, Wallowa County, Oregon. May–June.

14. *Hackelia californica* (A. Gray) I. M. Johnston. California Stickseed. Fig. 4215.

Echinosperrum californicum A. Gray, Proc. Amer. Acad. 17: 225. 1882.

Lappula californica Piper, Bull. Torrey Club 29: 546. 1902.

Hackelia californica I. M. Johnston, Contr. Gray Herb. No. 68: 47. 1923.

Hackelia elegans Brand, Pflanzenreich 4³⁵²: 128. 1931.

Lappula elegans Piper ex Brand, loc. cit. as a synonym.

Stems usually several, erect or ascending, leafy, 4–6 dm. high, villous-tomentose with spread-

ing hairs as are the petioles. Lower leaves 10–20 cm. long, oblong-oblancoate to narrowly spatulate, acute or rounded at apex, blade gradually narrowed to a petiole of about equal or shorter length, 1–2.5 cm. wide; upper stem-leaves sessile or subsessile, linear-oblong to broadly lanceolate, acute or acutish, all rather sparsely strigose; inflorescence at first narrow becoming loose and widely branched in age; calyx-lobes ovate, 2–2.5 mm. long; corolla white, the tube equaling the calyx-lobes, limb 6–10 mm. broad; appendages broader than long, puberulent; nutlets 5 mm. long, the dorsal face dull, muriculate, covered with subequal barbed prickles.

Open forests and edges of mountain meadows, Transition and Canadian Zones; southern Oregon in Jackson and Klamath Counties, south in the Coast Ranges to Humboldt and Lake Counties, and in the Sierra Nevada to Alpine County, California. Type locality: Mount Shasta, California. June–Aug.

15. *Hackelia munda* (Jepson) Ferris. Pink Stickseed. Fig. 4216.

Lappula californica var. *mundula* Jepson, Fl. Calif. 3: 309. 1943.

Stems 1 to several from a woody root, 5–9 dm. high, more or less velvety-pubescent throughout. Leaves oblanceolate, acute or obtuse at apex, 8–15 cm. long, stem-leaves sessile, reduced upward, the bracts tending to be broad and clasping; inflorescence with spreading branches, widely divaricate in fruit, fruiting pedicels 8–14 mm. long; flowers pink with whitish centers, fading blue, 12–20 mm. broad; tube about equaling the calyx, crests conspicuous, erect-spreading, narrowly ovate, slightly emarginate, puberulent; nutlets 6–8 mm. long, the dorsal face shining, smooth, prickles slender, 2.5–5 mm. long.

North slopes in red fir forests, Canadian Zone; in the Sierra Nevada from Yosemite National Park to Tulare County, California. Type locality near Long Meadow, Tulare County. June–July.

16. *Hackelia velutina* (Piper) I. M. Johnston. Velvety Stickseed. Fig. 4217.

Lappula velutina Piper, Bull. Torrey Club 29: 546. 1902.

Hackelia velutina I. M. Johnston, Contr. Gray Herb. No. 68: 47. 1923.

Hackelia longituba I. M. Johnston, Journ. Arnold Arb. 29: 237. 1948.

Stems 1 to several from the perennial root, 3–8 dm. high, clothed throughout with densely velvety pubescence. Lower leaves spatulate-oblancoate, acutish to obtuse, 8–14 cm. long, petiole about as long or longer than the blades; cauline leaves scattered or often numerous, oblong-linear to lanceolate, sessile with broad, often suborbicular bases, acute or obtuse at apex, gradually reduced upwards, 2–8 cm. long; inflorescence rather compact, spreading in fruit, the branches 5–10-flowered, fruiting pedicels 5–10 mm. long; calyx-lobes oblong, obtuse, densely canescent; corolla blue, tube 5 mm. long, well-exceeding the calyx, limb 12–20 mm. broad; appendages spreading, white, conspicuous, approximately one-third as long as the corolla-lobes, the deeply 2-lobed crests pilose, equalled in length by the oblong protuberance; nutlets 6–8 mm. long, the dorsal face dull, muriculate, beset with rather slender barbed prickles 2–3.5 mm. long and rather thinly puberulent.

Dry open forests, mainly Transition and Canadian Zones; Sierra Nevada, from Plumas County to Tulare County, California. Type locality: "General Grant Grove," Tulare County. June–Aug.

17. *Hackelia nervosa* (Greene) I. M. Johnston. Sierra Stickseed. Fig. 4218.

Echinosperrum nervosum Kell. Proc. Calif. Acad. 2: 146. fig. 42. 1862.

Lappula nervosa Greene, Pittonia 2: 182. 1891.

Hackelia nervosa I. M. Johnston, Contr. Gray Herb. No. 68: 47. 1923.

Stems 1 to several, erect, 2–5 dm. high, glabrous or pilose with spreading hairs. Basal leaves oblong-spatulate to linear-spatulate, narrowed to more or less winged petioles of about equal length, lower stem-leaves shorter, subsessile and acutish, those subtending the lower branches of the inflorescence ovate-lanceolate, subclasping at base, very acute or short-acuminate at apex, retrorsely appressed-pubescent beneath, strigose above, often thinly so on the upper leaves, harshly pubescent in age; racemes slender, 2–10-flowered; pedicels slender, at length spreading or recurved; calyx-lobes oblong to oblong-ovate, 2.5–3 mm. long; corolla blue, the buds pink, the tube 4 mm. long, pinkish; limb 6–8 mm. broad; appendages small, one-sixth as long as the corolla-lobes; stamens inserted on upper part of corolla-tube; nutlet 5 mm. long, broad-ovoid, dorsal face hispidulous, covered all over with long barbed prickles.

Moist places, Canadian Zone; Sierra Nevada from Plumas County to Fresno County, California. Type locality: head waters of Carson River, Alpine County. July–Aug.

18. *Hackelia Sharsmithii* I. M. Johnston. Sharsmith's Stickseed. Fig. 4219.

Hackelia Sharsmithii I. M. Johnston, Journ. Arnold Arb. 20: 398. 1939.

Lappula Sharsmithii Jepson & Bailey in Jepson, Fl. Calif. 3: 308. 1943.

Stems usually several from the branched crown of the stout perennial root, slender, 1–3 dm. high, strigose with strongly reflexed hairs. Leaves green, rather thinly reflexed-strigose, the lower oval to oblong-lanceolate, 2.5–7 cm. long, decurrent on the petiole of about the same length or longer, the upper clasping, ovate to ovate-lanceolate, 2–3.5 cm. long, acute at apex; racemes 2 or 3, terminal, 2–6 cm. long; pedicels 1–6 mm. long, recurved, strigose; calyx 2–2.5 mm. long, strigose; corolla blue with a yellow center, about 6 mm. broad; appendages lunate, ciliate on the margins above; nutlets ovoid, 2–2.5 mm. long, the marginal glochidiate prickles subulate, often bluish at tip, distinct or united at base to form a narrow wing, dorsal prickles 1 to few, short.

Shaded spots in shelter of rocks, Arctic-Alpine Zone; Mount Whitney region in Tulare and Inyo Counties, California. Type locality: Lone Pine Canyon, altitude 11,000 feet, Inyo County, California. Aug.–Sept.



4207



4208



4209



4210



4211



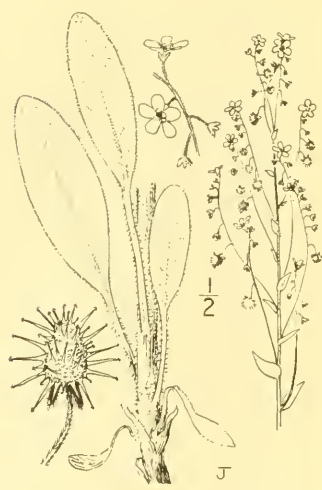
4212



4213



4214



4215

4207. *Hackelia setosa*
4208. *Hackelia diffusa*
4209. *Hackelia bella*

4210. *Hackelia arida*
4211. *Hackelia ciliata*
4212. *Hackelia venusta*

4213. *Hackelia cinerea*
4214. *Hackelia hispida*
4215. *Hackelia californica*

15. *ERITRÍCHIUM* Schrad. in Gaud. Fl. Helv. 2: 57. 1828.

Low depressed cushion-like perennials, with the short stems densely clothed with small often imbricate leaves. Flowers few in a raceme-like cluster terminating the slender flowering stems. Calyx-lobes ascending, linear. Corolla blue, funnelform, with short tube. Nutlets obliquely attached to the conical gynobase, smooth, the apex obliquely truncate, with a distinct, entire or toothed margin. [Name Greek, meaning wool and small hair, the original species being woolly-pubescent.]

A genus of about 30 species, inhabiting the boreal and temperate regions; 4 or 5 are North American. Type species, *Eritrichium nanum* Schrad.

1. *Eritrichium elongatum* (Rydb.) Wight. Pale Alpine Forget-me-not.

Fig. 4220.

Eritrichium aretioides var. *elongatum* Rydb. Mem. N.Y. Bot. Gard. 1: 327. 1900.

Eritrichium elongatum Wight, Bull. Torrey Club 29: 408. fig. d. 1902.

Oreocarya pulvinata A. Nels. Bot. Gaz. 40: 63. 1905.

Densely caespitose, forming cushion-like mats. Leaves closely overlapping, oblanceolate, 4–8 mm. long, 1.5–2 mm. broad, acute or obtuse, pilose, especially on the margins and tips, with long white hairs; flowering stems 2–6 cm. long, with scattered narrowly linear leaves; flowers in a short terminal raceme-like cluster; calyx-lobes linear, 3 mm. long; corolla-tube equaling the calyx-lobes, limb bright blue, 4–6 mm. broad, crests in the throat puberulent; nutlets smooth, 2 mm. long.

Rocky ridges, Boreal Zones; Wallowa Mountains, Oregon, east to Idaho, Montana, Wyoming and Colorado. Type locality: Spanish Basin, Montana. July–Aug.

Eritrichium Howardii (A. Gray) Rydb. Mem. N.Y. Bot. Gard. 1: 327. 1900. (*Cynoglossum Howardii* A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 188. 1886.) Similar to *E. elongatum*; leaves with dense closely appressed pubescence; dorsal surface of nutlet papillose and hispid; corolla-limb 7–9 mm. broad. Montana and northern Wyoming, mostly on the eastern side of the Rocky Mountains. Reported from the Cascades, Washington, on the basis of a specimen said to have been collected by Tweedy, but this is possibly a slip in labeling, as Tweedy also collected the species in Montana. Type locality: "Rocky Mountains in Montana."

16. *GREENEOCHARIS* Guerke & Harms in Engler & Prantl, Nat. Pflanzenf. Regist. 460. 1899.

Low, densely branched annuals with hispid or canescent herbage, containing a purple dye that leaves a stained impression of the plant on pressing paper. Flowers in leafy-bracted spikes terminating the numerous branchlets. Calyx 5-cleft to the middle, the tube scarious and circumscissile near the middle, the upper part bearing the lobes falling away, the lower cupulate, densely hispid, and persistent around the ovoid nutlets. [Named in honor of E. L. Greene, noted American botanist, and the Greek word meaning grace or beauty.]

A monotypic genus of western North America.

1. *Greeneocharis circumscissa* (Hook. & Arn.) Rydb. *Greeneocharis*. Fig. 4221.

Lithospermum ? *circumscissum* Hook. & Arn. Bot. Beechey 370. 1838.

Piptocalyx circumscissus Torr. in S. Wats. Bot. King. Expl. 240. 1871.

Krynitzkia circumscissa A. Gray, Proc. Amer. Acad. 20: 275. 1885.

Greeneocharis circumscissa Rydb. Bull. Torrey Club 36: 677. 1909.

Stems few to many from the base, strigose, more or less branched above, often forming a dense hemispheric mass 2–10 cm. high, the outer ones often decumbent. Leaves 3–15 mm. long, 1–2 mm. broad, the lower narrowly oblanceolate, the upper linear, obtuse, strigose or short-hispid; flowers in the axils of foliaceous bracts in short rather indefinite raceme-like clusters; corolla minute, limb 1–2.5 mm. broad; fruiting calyx 2.5–4 mm. long, the tube nearly as long as the lobes, at length circumscissile just below the sinuses, basal part persistent, cupulate, appressed-hispid; mature calyx-lobes narrowly linear-lanceolate, firm, more or less hispid, midrib slender; pedicels about 0.5 mm. long; nutlets 4, all similar or one slightly longer, triangular-ovoid to oblong-lanceolate, about 1.5 mm. long, smooth or obscurely muriculate; gynobase about two-thirds height of nutlets, pyramidal-oblong; style equaling or slightly exceeding nutlets.

Sandy or gravelly soils, Sonoran and Arid Transition Zones; eastern Washington south through eastern Oregon and California, east of the Sierra Nevada, to the mountain ranges of southern California and northern Lower California, east to southern Idaho, Utah and Arizona. Type locality: Snake Fort, Snake River, Idaho. April–Aug.

Greeneocharis circumscissa var. *hispida* J. F. Macbride, Proc. Amer. Acad. 51: 546. 1916. (*Krynitzkia dichotoma* Greene, Bull. Calif. Acad. 1: 206. 1885; *Wheelerella dichotoma* Grant, Bull. S. Calif. Acad. 5: 28. 1906; *Cryptantha circumscissa* var. *hispida* I. M. Johnston, Contr. Gray Herb. No. 74: 42. 1925.) Distinguished from the typical species by the spreading hispid pubescence of the stems. Sierra Nevada, California, on the western slopes in Fresno, Tulare and Kern Counties, and on the eastern slopes in the Lake Tahoe and Mount Whitney regions; also in western Nevada in the Carson Valley region. Type locality: Mount Whitney trail, California.

17. *ALLOCÀRYA* Greene, Pittonia 1: 12. 1887.

Low spreading annuals with linear entire leaves, the lowest opposite, and small flowers

in terminal spikes or racemes. Pedicels thickened at the summit and persistent. Calyx 5-divided, persistent, the segments narrow. Corolla salverform, white, yellow in the throat. Stamens included. Ovary 4-divided; style short. Nutlets crustaceous, smooth or variously roughened, attached at their bases or below the middle to the receptacle; scar of the attachment concave or raised. [Name Greek, meaning diverse and nut, referring to the great diversity of the surface of the nutlets.]

A western North American genus of about 40 species, all but one annuals. Type species, *Myosotis Chorisiana* Cham.

Plants perennial, coarse, densely soft-villous with spreading hairs.

1. *A. mollis*.

Plants slender, annuals.

Stems floriferous to near the base, prostrate; lower pedicels stout and recurved; calyx with indurated midrib, its lobes irregularly spreading or recurved in age.

Nutlets broadly ovoid, shiny, sparsely if at all tuberculate; scar surrounded by a high collar, about one-fourth length of nutlet.

2. *A. scripta*.

Nutlets lanceolate-ovoid, dull, granulate and tuberculate, scar not surrounded by a high collar, about one-fifth length of nutlet.

3. *A. humistrata*.

Stems not floriferous to base or if so the pedicels not stout and recurved.

Scar longer, deeply excavated, lateral one-fourth to half the length of the nutlet; nutlets often with prickles.

Spikes mostly geminate; plant erect, glabrous or nearly so and somewhat succulent; corolla 4-6 mm. broad.

4. *A. stricta*.

Spikes solitary at the ends of the branches, not geminate.

Nutlets broad, about two-thirds to nearly as broad as long; usually armed with prickles.

Nutlets not transversely rugose on the dorsal side, 2.5-3 mm. long; keel with prickles.

5. *A. Greenei*.

Nutlets transversely rugose on the dorsal side, 1.5-2 mm. long; keel and transverse ridges with prickles.

Prickles short and stout, covered with minute subulate trichomes.

6. *A. hystricula*.

Prickles long and slender, glochidiate at apex.

7. *A. acanthocarpa*.

Nutlets slender, about one-half as broad as long.

Dorsal keel thin and knife-like, armed with prickles; dorsal surface between keels smooth or tuberculate, glossy.

8. *A. Austiniae*.

Dorsal keel broader, not knife-like; dorsal surface between keels transversely rugose, dull not glossy.

9. *A. glyptocarpa*.

Scar smaller, one-fifth as long as nutlet or shorter, slightly if at all excavated, but margins sometimes upturned, thus becoming somewhat concave.

Nutlet-attachment exactly or practically basal, often substipitate; calyx-lobes strongly costate; plants somewhat succulent.

Stems prostrate; calyx-lobes connivent and turned to one side of flower.

10. *A. leptoclada*.

Stems erect or ascending; calyx-lobes spreading, not connivent to one side.

Plant with fistulous-enlarged stems; lateral keel of nutlets well-developed; calyx-ribs prominently indurated.

11. *A. glabra*.

Plant with slender not fistulous stems; lateral keels less prominent; calyx-ribs only slightly indurate.

12. *A. stipitata*.

Nutlet-attachment lateral to obliquely basal; calyx-ribs rarely enlarged.

Scar linear or nearly so and borne on the edge of a knife-like keel or rarely cuneate and sessile in *undulata*; coastal plants.

Ventral keel in an elongate depression, only near the base becoming groove-like.

13. *A. undulata*.

Ventral keel in a deep longitudinal groove the whole length, the groove sometimes infolding and more or less concealing the keel.

Nutlets dull and granulate or tuberculate; stems prostrate or trailing.

14. *A. Chorisiana*.

Nutlets smooth and shining; stems erect.

15. *A. lithocarya*.

Scar broad, not linear.

Racemes prevailingly geminate and bractless; erect dichotomous plants of the northwest coast; corolla 4-9 mm. broad.

Pubescence fine and soft, mostly appressed.

16. *A. figurata*.

Pubescence spreading and more or less hispid.

17. *A. hirta*.

Racemes solitary and bracteate at least at base.

Stems with distinctly spreading hairs.

Nutlets less than 2 mm. long, transverse ridges on dorsal side prominent; scar lateral in a groove formed by ridges; racemes with 1 or 2 bracts near base.

18. *A. Cooperi*.

Nutlets 2-2.5 mm. long, with low transverse ridges on dorsal side; scar supra-basal, oblique, not sunken in a groove; racemes well-bracted.

19. *A. salsa*.

Stems strigose or appressed-hispidulous.

Scar of nutlet in an areole broader than long or areole wanting; nutlets often asymmetrical.

Corolla 2-5 mm. broad; plants mostly erect; calyx-lobes distinctly ferruginous.

Racemes rather dense, bracteate only at base, often geminate.

20. *A. granulata*.

Racemes loose, bracteate to the middle or above, simple.

21. *A. Scouleri*.

Corolla 1-2 mm. broad; plants mostly spreading; calyx-lobes little if at all ferruginous.

Scar ovate to triangular, with thick margins divergent; nutlets dull.

22. *A. cognata*.

- Scar elongate, with thick knife-like erect or inflexed margins; nutlets glossy. 23. *A. Cusickii*.
- Scar of nutlet in an areole longer than broad; nutlets symmetrical or nearly so. Ventral keel not in a groove.
- Corolla 3–7 mm. broad; racemes bractless or nearly so. 24. *A. tenera*.
- Corolla 1–3 mm. broad; racemes bracteate more or less throughout.
- Scar suprabasal or nearly basal, oblique to the ventral keel. 25. *A. bracteata*.
- Scar distinctly lateral, parallel with the ventral keel or nearly so.
- Scar linear-oblong; nutlets usually muriculate or minutely bristly. 26. *A. hispidula*.
- Scar ovate or deltoid; nutlets not muriculate or bristly. 27. *A. trachycarpa*.
- Ventral keel in a conspicuous groove at least below middle.
- Nutlets with a thick bony pericarp, densely tuberculate and granulate. 28. *A. diffusa*.
- Nutlets with a thin pericarp, tuberculate, or more commonly granulate. 29. *A. californica*.

1. *Allocarya mollis* (A. Gray) Greene. Downy *Allocarya*. Fig. 4222.

Eritrichium molle A. Gray, Proc. Amer. Acad. 19: 89. 1883.

Krynitzkia mollis A. Gray, op. cit. 20: 267. 1885.

Allocarya mollis Greene, Pittonia 1: 20. 1887.

Plagiobothrys mollis I. M. Johnston, Contr. Gray Herb. No. 68: 74. 1923.

Perennial with a fleshy taproot, soft villous-tomentous throughout; stems usually many, branched, 1–5 dm. long, ascending or trailing. Leaves numerous, opposite, linear or the lower linear-spatulate; racemes mostly solitary at the ends of the branches, naked or bracteate below; mature calyx 4–5 mm. long, lobes lanceolate; corolla 5–10 mm. broad; nutlets ovoid, about 1.5 mm. long, gray, median keel distinct only near apex but occasionally extending to middle, transverse ridges irregular, merging at their ends to form an indefinite lateral ridge or sometimes represented by tubercles; scar conspicuous, ovate or triangular.

Moist alkaline soils, Upper Sonoran and Arid Transition Zones; Klamath and Harney Counties, Oregon, south to Modoc and Sierra Counties, California, and adjacent Nevada. Type locality: "Sierra Valley, California, on alkaline wet flats and borders of ponds." June–Aug.

Allocarya mollis var. *vestita* (Greene) Jepson, Fl. W. Mid. Calif. 442. 1901. (*Allocarya vestita* Greene, *Erythraea* 3: 125. 1895; *Plagiobothrys mollis* var. *vestitus* I. M. Johnston, Contr. Gray Herb. No. 68: 75. 1923.) Plants more rank, usually decumbent; upper leaves alternate; racemes usually 2 at end of branches, bractless; nutlets brown, more or less reticulate, the interspaces longer, somewhat granulate, lateral keels not evident. Known only from a single collection by Congdon near Petaluma, Sonoma County, California.

2. *Allocarya scripta* Greene. Scribe's *Allocarya*. Fig. 4223.

Allocarya scripta Greene, Pittonia 1: 142. 1887.

Plagiobothrys scriptus I. M. Johnston, Contr. Arnold Arb. No. 3: 27. 1932.

Branches prostrate, 1–2 dm. long or sometimes much reduced and shorter than the basal leaves, strigose. Leaves linear or narrowly oblanceolate, 5–20 mm. long, thinly strigose-hispidulose especially in the midvein and margins; spikes leafy-bracteate, pedicels reflexed; calyx accrescent, the lobes loosely erect, at length contorted; corolla 2 mm. broad; nutlets 2 mm. long, deltoid-ovoid, acute, the dorsal side with fine white keel and reticulations, beset with tufts of bristles, the areolae between large, dark-colored and finely papillate; ventral side with a high thin keel extending to the broad scar, this about one-fourth the length of nutlet and with a broad dorsal pit surrounded by a prominent border or margin.

A little-known species originally collected by Dr. Parry in 1887, locality not definitely known, and again at Ione, Amador County, *Eastwood*, 1114, and near La Grange, Stanislaus County, *Hoover* 2053. Mr. Hoover also found at La Grange a dwarf acaulescent form. March.

3. *Allocarya humistrata* Greene. Dwarf *Allocarya*. Fig. 4224.

Allocarya humistrata Greene, Pittonia 1: 16. 1887.

Plagiobothrys humistratus I. M. Johnston, Contr. Gray Herb. No. 68: 77. 1923.

Allocarya humistrata var. *similis* Jepson, Man. Fl. Pl. Calif. 853. 1925.

Allocarya limicola Piper, Contr. U.S. Nat. Herb. 22: 97. 1920.

Allocarya sigillata Piper, loc. cit.

Stems several from the base, mostly prostrate, rather stout, glabrous or sparsely puberulent. Leaves linear, 1–2 cm. long; spikes 5–10 cm. long, rather remotely flowered in age; fruiting pedicels stout, erect, or sometimes spreading or slightly deflexed; calyx accrescent in fruit and 6–10 mm. long, erect, sometimes all turned to one side forming a row; nutlets ovoid, sparsely short-bristly and tuberculate on the dorsal side, keeled on the ventral side and sparingly rugulose; scar ovate-deltoid, subbasal.

Low places especially in "hog wallows," Sonoran Zones; Livermore, Sacramento and San Joaquin Valleys. Type locality: Antioch, California. March–May.



4216



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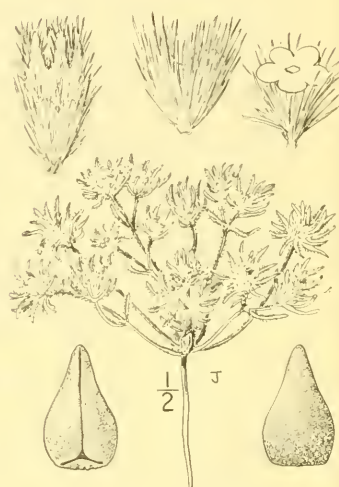
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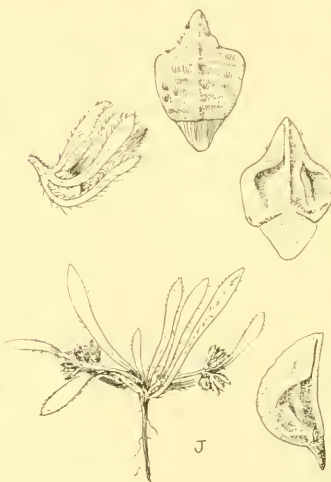
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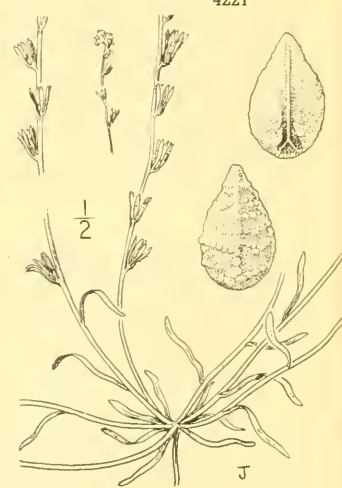
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4224

4216. *Hackelia mundula*
4217. *Hackelia velutina*
4218. *Hackelia nervosa*

4219. *Hackelia Sharsmithii*
4220. *Eritrichium elongatum*
4221. *Greeneocharis circumscissa*

4222. *Allocarya mollis*
4223. *Allocarya scripta*
4224. *Allocarya humistrata*

4. *Allocarya stricta* Greene. Calistoga *Allocarya*. Fig. 4225.

Allocarya stricta Greene, Pittonia 2: 231. 1892.

Allocarya californica var. *stricta* Jepson, Fl. W. Mid. Calif. 443. 1901.

Plagiobothrys strictus I. M. Johnston, Contr. Gray Herb. No. 68: 78. 1923.

Annual, nearly or quite glabrous, somewhat succulent; stems simple or branched, 1-4 dm. high, branches strict, elongated, and usually dichotomous. Leaves glabrous or with a few short ascending hairs pustulate at base, linear, 3-9 cm. long; racemes solitary or commonly several, 3-15 cm.; mature calyx about 3 mm. long, usually rusty-strigose; corolla 4-5 mm. broad; nutlets ovoid, about 1.5 mm. long, median keel distinct to along the middle, angles slightly keeled, dorsal surface granulate and transversely ridged with more or less distinct rows of tubercles, ventral surfaces with approximate narrow diagonally transverse ridges; scar lateral, excavated, lanceolate, about one-third the length of the nutlet.

A well-marked endemic, found on alkaline flats near the sulphur springs, Calistoga, Napa County, California. March-June.

5. *Allocarya Greenei* (A. Gray) Greene. Greene's *Allocarya*. Fig. 4226.

Echinosperrum Greenei A. Gray, Proc. Amer. Acad. 12: 163. 1877.

Allocarya Echinoglochis Greene, Pittonia 1: 15. 1887.

Allocarya Greenei Greene, Man. Bay. Reg. 259. 1894.

Plagiobothrys Greenei I. M. Johnston, Contr. Gray Herb. No. 68: 76. 1923.

Annual, stem simple or branched from near the base, ascending or spreading, 1-4 dm. long, herbage strigulose throughout except the glabrous or nearly glabrous upper surface of the leaves. Basal leaves linear or linear-spatulate, 1-6 cm. long, rather crowded but mostly withering before plant matures; stem-leaves few, the lower usually opposite the upper, alternate; racemes loose, 5-15 cm. long; lower flowers usually bracteate; mature calyx 3-7 mm. long, rather densely strigose; corolla 2.5-4 mm. broad; nutlets broadly ovoid, 2.5-3 mm. broad, constricted near the apex, armed along the keels and in the spaces between the firm subulate glochidiate prickles, transverse ridges absent; scar deep, broadly flanked, ovate or deltoid.

Gravelly or clay soils, especially on the bottom of desiccated winter pools, Upper Sonoran Zone; Rogue River Valley, Jackson County, Oregon, to Sonoma and San Joaquin Counties, California. Type locality: Yreka, Siskiyou County, California. March-May.

6. *Allocarya hystricula* Piper. Bearded *Allocarya*. Fig. 4227.

Allocarya hystricula Piper, Contr. U.S. Nat. Herb. 22: 87. 1920.

Allocarya Greenei var. *hystricula* Jepson, Man. Fl. Pl. Calif. 853. 1925.

Echinoglochis hystricula Brand, Rep. Spec. Nov. 21: 253. 1925.

Plagiobothrys hystriculus I. M. Johnston, Contr. Arnold Arb. No. 3: 32. 1932.

Slender annual with decumbent, sparsely strigose branches 3-4 dm. long, the branches often simple. Lower leaves linear to linear-oblancoate, acute, 1-2 cm. long, strigose on both sides but more thinly on the upper; racemes elongated, loosely flowered, the lower flowers bracteate; corolla shorter than the calyx, about 1 mm. broad; calyx conspicuously bristly with ascending or somewhat appressed bristles, lobes strongly accrescent, becoming 5-6 mm. long; nutlets broadly ovoid, 2 mm. long, dorsal side obscurely ridged on the median line, densely covered with bristles, these armed their whole length with divaricate barbs and joined at their bases by ridges, interspaces granulate, ventral side keeled and obliquely rugulose but not bristly; scar sunken, ovate, half as long as the nutlet.

Grassy hillsides and plains, Upper Sonoran Zone; Solano County, California. Type locality: Montezuma Hills, Solano County. April-May.

7. *Allocarya acanthocarpa* Piper. Adobe *Allocarya*. Fig. 4228.

Allocarya acanthocarpa Piper, Contr. U.S. Nat. Herb. 22: 87. 1920.

Plagiobothrys Piperi I. M. Johnston, Contr. Gray Herb. No. 68: 75. 1923.

Plagiobothrys acanthocarpus I. M. Johnston, Contr. Arnold Arb. No. 3: 33. 1932.

Annual, herbage strigose; stems slender, usually branched below, spreading or erect, 1-4 dm. long, the branches simple or branched. Lower leaves linear to spatulate-linear, 2-6 cm. long; upper leaves and bracts linear to narrowly oblong; racemes bracted becoming loose and elongated; mature calyx 3-6 mm. long, in age often stellately spreading; corolla scarcely surpassing the calyx, 1-2.5 mm. broad; nutlets ovoid, mostly 1.5-2 mm. long, contracted toward the apex, dorsal side reticulate with thin ridges, keel and ridges armed with minutely barbed subulate spines, interspaces tuberculate; ventral side distinctly keeled from the large ovate or deltoid excavated scar, the sides bearing transverse ridges, keel and ridges unarmed.

Vernal pools and adobe flats, Sonoran Zones; Lower Sacramento Valley, San Joaquin Valley and lower South Coast Ranges south to San Diego County, California, and northern Lower California. Type locality: Caliente, Kern County, California. March-May.

The following species described by Piper (Contr. U.S. Nat. Herb. 22: 88-91. 1920.) are referable to this species: *Allocarya oligochaeta*, *A. echinacea*, *A. Eastwoodiae*, *A. spiculifera*, *A. anaglyptica*, *A. papillata*, *A. microcarpa*.

8. *Allocarya Austiniae* Greene. Austin's *Allocarya*. Fig. 4229.

Allocarya Austiniae Greene, Pittonia 1: 18. 1887.

Allocarya cristata Piper, Contr. U.S. Nat. Herb. 22: 89. 1920.

Echinoglochis Austiniae Brand, Rep. Spec. Nov. 21: 253. 1925.

Allocarya Austiniae var. *cristata* Jepson, Man. Fl. Pl. Calif. 853. 1925.

Plagiobothrys Austiniae I. M. Johnston, Contr. Arnold Arb. No. 3: 36. 1932.

Allocarya Austiniae var. *nuda* Hoover, Leaflets West. Bot. 1: 228. 1936.

Stems branching from the base, the branches simple, erect or ascending above the decumbent base, about 1 dm. long, slender, strigose. Basal leaves tufted, linear, 2–3 cm. long, pustulate-setose on the margins and the midvein beneath, otherwise glabrous; stem-leaves usually only 1 or 2, strigose; raceme solitary and simple, about as long as the sterile portion of the stem, loosely flowered, only the lower flowers bracteate; pedicels densely strigose, the lower about 2 mm. long; corolla 1.5–2 mm. broad; calyx-lobes 4 mm. long in fruit, densely strigose-hirsute, and usually rufous at the tip, base of the tube about 3 mm. broad; nutlet about 3 mm. long, the body somewhat quadrate, abruptly narrowed into a beak-like tip about as long as the body, dorsal keel high and armed partly or throughout with stout spines or processes, the lateral angles also often similarly armed, the processes armed with coarse recurving hairs, ventral side prominently keeled and rugulose especially toward the base, also sometimes spiny; scar mostly triangular.

Usually in clay depressions, Upper Sonoran Zone; Redding, Shasta County, southward along the eastern side of the Sacramento Valley and the foothills of the Sierra Nevada to Stanislaus County, California. Type locality: Butte County. April–May.

9. *Allocarya glyptocarpa* Piper. Sculptured *Allocarya*. Fig. 4230.

Allocarya glyptocarpa Piper, Contr. U.S. Nat. Herb. 22: 80. 1920.

Glyptocaryopsis glyptocarpa Brand, Pflanzenreich 4²⁵²: 104. 1931.

Plagiobothrys glyptocarpus I. M. Johnston, Contr. Arnold Arb. No. 3: 37. 1932.

Annual, stems branching from near the base, branches simple, slender, ascending, 1–5 dm. high, strigose. Lower leaves linear or narrowly spatulate, 4–8 cm. long; upper leaves oblanceolate to oblong-linear; racemes simple, loosely flowered, elongated, bracteate near the base; calyx-lobes becoming 3–5 mm. long; corolla 5–9 mm. broad; nutlets narrowly ovoid, about 2 mm. long, incurved, acute or constricted above and somewhat beaked; dorsal side prominently keeled, transverse ridges prominent but irregular, interspaces finely tuberculate, ventral side keeled down to the scar, the sides with prominent and approximately diagonal ridges; scar deeply excavated, narrowly triangular, nearly half as long as the nutlet.

Moist places, along streams, Upper Sonoran Zone; Jackson County, Oregon, to Lake and Butte Counties, California. Type locality: "Moist cultivated ground, eight miles north of Oroville," Butte County, California. March–June.

Allocarya glyptocarpa subsp. *modesta* (I. M. Johnston) Abrams. (*Plagiobothrys glyptocarpus* var. *modestus* I. M. Johnston, Contr. Arnold Arb. No. 3: 38. 1932.) Flowers small, corolla 2–3 mm. broad. Known only from the type locality: "in the yellow pine and oak belt, Cedar Crest near Grass Valley, Nevada County," California.

Allocarya distantiflora Piper, Contr. U.S. Nat. Herb. 22: 91. 1920. (*Glyptocaryopsis distantiflora* Brand, Pflanzenreich 4²⁵²: 105. 1931; *Plagiobothrys distantiflorus* I. M. Johnston, Contr. Arnold Arb. No. 3: 36. 1932.) Similar to *Plagiobothrys glyptocarpus* and probably not specifically distinct. Flowers smaller, barely exceeding the calyx and 1–2 mm. broad; nutlet ovoid, much-constricted above the middle, sharply angled, 1.5 mm. long, the dorsal side dentately keeled its entire length and coarsely transverse-rugulose, ventral side keeled from scar to apex. Collected at Madera, California, and known only from the type locality.

10. *Allocarya leptoclada* Greene. Smooth-stemmed *Allocarya*. Fig. 4231.

Eritrichium californicum var. *subglochidiatum* A. Gray, Bot. Calif. 1: 526. 1876.

Allocarya leptoclada Greene, Pittonia 3: 109. 1896.

Allocarya orthocarpa Greene, op. cit. 4: 235. 1901.

Allocarya versicolor Brand, Rep. Spec. Nov. 19: 71. 1923.

Plagiobothrys leptocladus I. M. Johnston, Contr. Arnold Arb. No. 3: 38. 1932.

Stem branched from the base, the branches prostrate, 1–3 dm. long, straight, slender and somewhat wiry, thinly strigose, often floriferous nearly to the base. Leaves narrowly linear, the lower 3–10 cm. long, glabrous or nearly so above, thinly strigose beneath, the hairs mostly pustulate at base; racemes simple, becoming loosely flowered; mature calyx-lobes usually accrescent, 3–8 mm. long, barely 1 mm. wide, connivent or sometimes spreading, more or less definitely curved toward one side; corolla 1–2 mm. broad; nutlets narrowly to broadly lanceolate, acute; dorsal side keeled only above the middle, more or less obliquely or transversely rugose, smooth, granulate or penicillate-hairy; ventral side keeled down to the basal scar, this horizontal or slightly oblique, not surrounded by a ridge, but frequently with a downwardly directed dorsal flange.

In heavy, usually alkaline soils, Sonoran Zones; Sherman and Malheur Counties, eastern Oregon, to southern Idaho and northern Utah, and south in the central valleys of northern California and coastal valleys of southern California to northern Lower California. Type locality: Pine Creek, Eureka County, Nevada. March–July.

The following species described by Piper (Contr. U.S. Nat. Herb. 22: 92–96. 1920) are referable to this species: *A. oricola*, *A. divergens*, *A. Wilcoxii*, *A. tuberculata*, *A. charaxata*.

11. *Allocarya glàbra* (A. Gray) J. F. Macbride. Glabrous *Allocarya*. Fig. 4232.

Lithospermum glabrum A. Gray, Proc. Amer. Acad. 17: 227. 1882.

Allocarya salina Jepson, Fl. W. Mid. Calif. 442. 1901.

Allocarya glabra J. F. Macbride, Proc. Amer. Acad. 51: 543. 1916.

Plagiobothrys glaber I. M. Johnston, Contr. Gray Herb. No. 68: 77. 1923.

Stems erect, with stout erect branches from near the base, 1-2 dm. high, succulent, very sparsely strigillose. Lower leaves linear, 5-8 cm. long, upper ones linear-ob lanceolate and shorter, glabrous above, sparsely pustulate and strigose below; racemes rather densely flowered, erect and somewhat fistulous, leaf-bracted at base, unilateral with the flowers somewhat 2-ranked; corolla about equaling the calyx-lobes, the limb about 1.5 mm. broad; fruiting calyx sessile, accrescent, 8-10 mm. long, the lobes united below with a tube about 2 mm. long, becoming firm by the indurated midrib; nutlets lanceolate, 2 mm. long, the body flattened and the apex attenuate and beak-like; dorsal side with a cauline keel and two rather definite lateral ones, also with a few transverse ridges mostly above the middle, tuberculate; ventral side keeled the whole length, weakly tuberculate; scar basal, circular, substipitate.

Salt marshes and alkaline flats, Upper Sonoran Zone; margin of San Francisco Bay in Alameda and Santa Clara Counties, and near Hollister, San Benito County. Type locality: "Apache Pass, S. Arizona, Lemmon, 1881." "Some misplacement of labels is to be suspected, for the form is common in the Alameda marsh lands, particularly about Mount Eden." K. Brandegee, Zoe 5: 94-95. 1901.

12. *Allocarya stipitàta* Greene. Stipitate *Allocarya*. Fig. 4233.

Allocarya stipitata Greene, Pittonia 1: 19. 1887.

Leppula stipitata Druce, Rep. Bot. Exch. Cl. Brit. Isles 5: 38. 1918.

Allocarya ambigens Piper, Contr. U.S. Nat. Herb. 22: 96. 1920.

Plagiobothrys stipitatus I. M. Johnston, Contr. Gray Herb. No. 68: 77. 1923.

Stems erect or ascending, 1-5 dm. high, branching at or above the base, somewhat succulent, yellowish green and shining, but very finely strigose. Basal leaves linear or narrowly spatulate, upper leaves similar but shorter; racemes at length elongated and rigidly erect and wiry, mostly unilateral, leafy-bracteate below; pedicels stout and strict; calyx accrescent, the base and lower part of lobes developing prominent indurated midribs; lobes lanceolate to linear, 5-8 mm. long, erect or spreading; corolla 5-12 mm. broad, well surpassing the calyx; nutlets lanceolate to narrowly ovoid, 1.5-2.5 mm. long, often constricted above into a short beak, straight or only slightly curved, rugose above the middle with oblique ridges, tuberculate below; ventral side keeled to the base, tuberculate or somewhat rugose; scar basal, small, sessile or obscurely stipitate.

Low places in heavy soils, Upper Sonoran Zone; Upper Rogue River Valley, Jackson County, Oregon, Sacramento Valley and surrounding foothills, also Sonoma, Napa, and (Hollister) San Benito Counties, California. Type locality: Sacramento Valley, California. March-June.

Allocarya stipitata subsp. *micrantha* Piper, Contr. U.S. Nat. Herb. 22: 94. 1920. (*Plagiobothrys stipitatus* var. *micranthus* I. M. Johnston, Contr. Arnold Arb. No. 3: 45. 1932.) Corolla 2.5 mm. broad, otherwise like the typical species. Moist places, Upper Sonoran and Arid Transition Zones; Harney County, Oregon; California, common in the Sacramento Valley, but with widely scattered stations throughout the state from Larsen and Lake Counties to Campo, San Diego County and the Sierra Nevada (Yosemite Valley and Giant Forest). Type locality: Stockton, California.

13. *Allocarya undulàta* Piper. Coast *Allocarya*. Fig. 4234.

Allocarya undulata Piper, Contr. U.S. Nat. Herb. 22: 104. 1920.

Allocarya inornata Piper, op. cit. 106.

Allocarya Chorisiana var. *undulata* Jepson, Man. Fl. Pl. Calif. 852. 1925.

Plagiobothrys undulatus I. M. Johnston, Contr. Arnold Arb. No. 3: 46. 1932.

Stems branching near the base, branches slender ascending or more or less sprawling in age, 1-3 dm. long. Lower leaves linear, 3-6 cm. long; racemes usually with a few scattered bracts, loosely flowered; calyx slightly accrescent, rather sparsely villous-hispidulous, lobes about 2 mm. long, lanceolate, erect; corolla 1.5-2 mm. broad; nutlets ovoid or lanceolate-ovoid, depressed, dorsal side keeled toward the apex and transversely rugose with crowded low undulate ridges, these becoming reduced to tubercles toward the base, finely granulate; ventral side keeled from the apex to scar, scar linear or nearly so, about one-fifth length of nutlet and lying in an elongate depression formed by low ridges paralleling it.

Moist adobe or dry soils in valleys and mesas near the coast, Transition and Upper Sonoran Zones; Marin County to San Diego County, California. Type locality: grain field near ocean, Santa Barbara. April-Aug.

14. *Allocarya Chorisiana* (Cham.) Greene. Artist's *Allocarya*. Fig. 4235.

Myosotis Chorisiana Cham. Linnaea 4: 444. 1829.

Eritrichium Chorisianum A. DC. Prod. 10: 130. 1846.

Eritrichium connatifolium Kell. Proc. Calif. Acad. 2: 163. fig. 51. 1862.

Krynitzkia Chorisiana A. Gray, Proc. Amer. Acad. 20: 267. 1885.

Allocarya Chorisiana Greene, Pittonia 1: 13. 1887.

Stems usually trailing and simple up to the fourth or sixth pair of leaves, 1-4 dm. long, sparsely strigose; internodes usually elongated. Leaves linear, all opposite up to the flowering branches, the lowest ones connate at base; bracts subtending the lower flowers, broadly lanceolate; racemes loose and elongated in age; pedicels slender, 2-15 or rarely 30 mm. long, often spreading or recurved, strigose, especially so toward the apex; calyx about 4 mm. long, lobes lanceolate, ascending or erect, strigose; corolla showy, 6-10 mm. broad; nutlets ovoid, dorsal side keeled only toward the apex, transverse ridges irregularly scattered or somewhat reticulate,



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4231



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4225. *Allocarya stricta*
 4226. *Allocarya Greenei*
 4227. *Allocarya hystericula*

4228. *Allocarya acanthocarpa*
 4229. *Allocarya Austiniae*
 4230. *Allocarya glyptocarpa*

4231. *Allocarya leptoclada*
 4232. *Allocarya glabra*
 4233. *Allocarya stipitata*

tuberculate, surface granulate; ventral side with the sides diagonally rugose, and forming a narrow longitudinal groove enclosing the thin keel and the knife-like attachment, both of about equal length.

Moist places and grassy slopes, Upper Sonoran Zone; San Francisco to Santa Cruz and inland to Crystal Lake, San Mateo County, California. Type locality: San Francisco. March-May.

This species was discovered in 1816 by botanists of the Romanzoff Expedition, and named for L. J. Choris, the artist of that famous expedition.

Allocarya Chorisiana var. *Hickmanii* Jepson, Man. Fl. Pl. Calif. 852. 1925. (*Allocarya Hickmanii* Greene, Pittonia 1: 13. 1887; *A. myriantha* Greene, Erythea 3: 125. 1895; *A. Jonesii* Brand, Rep. Spec. Nov. 18: 313. 1922; *Plagiobothrys Chorisianus* var. *Hickmanii* I. M. Johnston, Contr. Arnold Arb. No. 3: 49. 1932.) Stems branched from the base, prostrate, the lower internodes short; pedicels mostly shorter than the calyx; corolla 5-6 mm. broad. Pescadero, Santa Cruz County, south along the coast to northern San Luis Obispo County, California. Type locality: southern Monterey County.

15. *Allocarya lithocarya* Greene. Sculptured *Allocarya*. Fig. 4236.

Krynitzkia lithocarya Greene ex A. Gray, Proc. Amer. Acad. 20: 265. 1885.

Allocarya lithocarya Greene, Pittonia 1: 12. 1887.

Plagiobothrys lithocaryus I. M. Johnston, Contr. Gray Herb. No. 68: 76. 1923.

Stems erect, simple or with a few ascending branches, strigose. Leaves linear, 1.5-3.5 cm. long, strigose on both sides; racemes loosely flowered in age, leafy-bracteate at least below; pedicels slender, the lowest often 5-10 mm. long; corolla 2 mm. broad, slightly exceeding the calyx; fruiting calyx-lobes about 4 mm. long; nutlets whitish, smooth and shining, ovoid, 2.5 mm. long, rounded and rather faintly keeled on the dorsal side, somewhat flattened on the ventral side, with the keel hidden, from above the middle downward, by a groove-like infolding of the lateral angles; scar linear, but similarly hidden by the folds.

A local endemic, Upper Sonoran Zone; near Lakeport, Lake County (*Curran*), and Potter Valley, eastern Mendocino County (*Purpus*). Type locality: Lakeport. April-May.

16. *Allocarya figurata* Piper. Fragrant *Allocarya*. Fig. 4237.

Allocarya figurata Piper, Contr. U.S. Nat. Herb. 22: 101. 1920.

Plagiobothrys figuratus I. M. Johnston ex M. E. Peck, Man. Pl. Oregon 609. 1941.

Allocarya Scouleri and *Plagiobothrys Scouleri* of authors, but not as to synoptic type (*Myosotis Scouleri* Hook. & Arn.)

Stems erect, simple below or freely branched from the base, 1.5-4.5 dm. high, strigose. Lower leaves subulate-linear, 4-12 cm. long, the upper linear to linear-lanceolate, 1-5 cm. long, strigose; racemes mostly geminate, 5-20 cm. long in age, bractless or sometimes with a single bract at base; pedicels slender, 0.5-2 mm. long; calyx at maturity 3-5 mm. long, villous and more or less ferruginous; corolla showy, 4-8 mm. broad; nutlets ovoid, 1-1.5 mm. long, dorsal side keeled to about the middle and more or less reticulate-rugose, the keel and ridges usually tuberculate-dentate, the interspaces commonly granulate or minutely tuberculate; ventral side with a small lateral suprabasal ovate scar, and diagonal on either side of the thin keel.

Wet meadows and water courses, mostly Humid Transition Zone; Vancouver Island and western Washington to Curry and Jackson Counties, Oregon. Type locality: "Frye's Ranch, Illahe, Curry County, Oregon." April-July.

17. *Allocarya hirta* Greene. Rough *Allocarya*. Fig. 4238.

Allocarya hirta Greene, Pittonia 1: 161. 1888.

Allocarya Scouleri var. *hirta* Nels. & Macbr. Bot. Gaz. 61: 36. 1916.

Allocarya calycosa Piper, Contr. U.S. Nat. Herb. 22: 101. 1920.

Plagiobothrys Scouleri var. *hirtus* I. M. Johnston, Contr. Arnold Arb. No. 3: 52. 1932.

Plagiobothrys hirtus I. M. Johnston, Journ. Arnold Arb. 16: 193. 1935.

Annual with an erect stoutish stem, about 3 dm. high, usually simple below, glabrate below, setose-hirsute above, especially on the branches, with spreading hairs, branches ascending. Leaves of the main stem opposite, connate at base, linear, 2.5-4 cm. long, nearly or quite glabrous except for marginal setose, pustulate bristles, those of the branches mostly alternate and shorter, pustulate-setose throughout with no appressed pubescence; racemes in pairs terminating the branches, bractless; pedicels slender, 1-2 mm. long; calyx 4 mm. long in fruit, the lobes erect, densely setose-hirsute; corolla 5 mm. broad; nutlets ovoid, barely 2 mm. long, grayish brown, the dorsal side rounded, ridges inconspicuously reticulate, rather obscurely rugulose and tuberculate; ventral side rugulose and sparingly tuberculate, prominently keeled.

Boggy ground, Humid Transition Zone; Umpqua Valley, apparently very local in the vicinity of Drain. Type locality: "Umpqua Valley, Oregon, 25 June, 1887, Thomas Howell [no. 1227]." May-July.

Allocarya hirta subsp. *corallicarpa* (Piper) Abrams. (*Allocarya corallicarpa* Piper, Proc. Biol. Soc. Wash. 37: 93. 1924; *Plagiobothrys Scouleri* var. *corallicarpus* I. M. Johnston, Contr. Arnold Arb. No. 3: 52. 1932; *P. hirtus* var. *corallicarpus* I. M. Johnston, Journ. Arnold Arb. 16: 193. 1935.) Nutlets deeply and irregularly alveolate with conspicuous high thin ridges and papillae. Upper Rogue River Valley, Jackson and Josephine Counties, Oregon. Type locality: Grants Pass, Oregon.

18. *Allocarya Coöperi* Greene. Cooper's *Allocarya*. Fig. 4239.

Eritrichium Cooperi A. Gray, Proc. Amer. Acad. 19: 89. 1883.

Krynitzkia Cooperi A. Gray, op. cit. 20: 267. 1885.

Allocarya Cooperi Greene, Pittonia 1: 19. 1887.

Plagiobothrys Parishii I. M. Johnston, Contr. Gray Herb. No. 68: 78. 1923.

Stems densely branched from the base, prostrate, slender, 5–30 cm. long, hispidulous with whitish spreading hairs. Leaves linear or the upper oblong, 2–4 mm. broad; racemes becoming loose and slender, 3–10 cm. long, usually with 1 to few bracts below the middle; pedicels slender, 1–2 mm. long or the lowest sometimes longer; mature calyx tending to be deciduous, 2–3 mm. long, hispidulous with ascending hairs; corolla white with yellow throat, 3–5 mm. broad; nutlets about 1.5 mm. long, the axial one often a little larger and duller than the others, ovoid to broadly lanceolate, rather abruptly acute at apex; dorsal side keeled near the apex, strongly rugulose with transverse ridges, then sometimes reduced to tubercles toward the base; ventral side reticulate-rugulose; scar of the axial nutlet triangular-ovate, the other nutlets with a linear or nearly linear scar.

Wet alkaline soils, about desert springs, Sonoran Zones; Owens Valley, Inyo County, and western Mojave Desert (Rabbit Springs, Lovejoy Springs and Camp Cady), California. Type locality: Camp Cady, between Dagget and the Mojave Sink. March–June.

19. *Allocarya salsa* Brandg. Salty *Allocarya*. Fig. 4240.

Allocarya salsa Brandg. Bot. Gaz. 27: 452. 1899.

Allocarya jucunda Piper, Bull. Torrey Club 29: 643. 1902.

Allocarya Cusickii var. *jucunda* Nels. & Macbr. Bot. Gaz. 61: 36. 1916.

Plagiobothrys salsus I. M. Johnston, Contr. Gray Herb. No. 68: 78. 1923.

Stems branched from or near the base, erect or ascending, 6–16 cm. long, glabrate or sparsely hirsute. Leaves linear to narrowly oblong-ob lanceolate, 3–6 cm. long, bristly ciliate on the margins and sometimes sparsely pustulate-hirsute on the upper surface, especially near the apex; racemes leafy-bracted, loosely flowered; calyx subsessile, 4–5 mm. long, bristly hirsute, strongly ridged at base; corolla 3–4 mm. broad; nutlets lanceolate, 2–2.5 mm. long; dorsal side rugulose with transverse ridges above the middle, granulated below the middle but without ridges; keel on ventral side low, vein-like, extending to the small ovate-lanceolate basal scar, the sides with a few indistinct ascending lines.

Soda springs or alkaline ridges and marshes, Upper Sonoran Zone; Lake, Harney, and Malheur Counties, southeastern Oregon south to Nevada. Type locality: "Alkaline soil, Twin springs, Nevada." May–July.

Allocarya lamprocarpa Piper, Proc. Biol. Soc. Wash. 37: 94. 1924. (*Plagiobothrys lamprocarpus* I. M. Johnston, Contr. Arnold Arb. No. 3: 56. 1932.) Stems erect, 1–3 dm. high, strigose. Leaves pustulate and appressed-hispidulous beneath, glabrate above; racemes unilateral, slender, bracteate toward the base; pedicels less than 1 mm. long; mature calyx setulose, thickened at base; lobes narrowly lanceolate, 1–2 mm. long, erect or ascending; nutlet solitary, glossy, broadly ovoid and somewhat plano-convex, incurved and somewhat contracted at apex, oblique and hollowed at base, dorsal side broadly keeled to the middle and with low, broad transverse ridges, ventral side with the lower half of the keel seated in a deep groove; scar small, concave, triangular-ovate. A local species known only from the type locality: "in moist places in an old road," Grants Pass, Josephine County, Oregon.

20. *Allocarya granulata* Piper. Oregon *Allocarya*. Fig. 4241.

Allocarya granulata Piper, Contr. U.S. Nat. Herb. 22: 109. 1920.

Allocarya fragilis Brand, Rep. Spec. Nov. 18: 312. 1922.

Plagiobothrys granulatus I. M. Johnston, Contr. Arnold Arb. No. 3: 57. 1932.

Stems erect, 1–3 dm. high, branching from near the base, the branches strict or ascending, often re-branched, more or less strigose. Leaves appressed-hispidulous to glabrate, the lower linear, 3–7 cm. long; racemes slender, usually solitary, rather closely flowered, only the lowest flowers bracteate; pedicels 1 mm. or less in length, erect or ascending; mature calyx appressed-hispidulous, 2.5–3 mm. long, linear or nearly so, erect or nearly so, the tips ferruginous; corolla 2–3.5 mm. broad; nutlet ovoid to narrowly so, about 1.5 mm. long, dorsal side with transverse ridges and a medial keel, granulate to tuberculate and sometimes somewhat muricate; ventral side broadly angulate, dorso-ventrally rounded at base; scar suprabasal, small, ovate, and oblique or nearly lateral.

Low moist ground, Humid Transition Zone; Chehalis and Pierce Counties to Klickitat County, Washington, and Willamette Valley, Oregon. Type locality: Salem, Oregon. May–Aug.

21. *Allocarya Scouleri* (Hook. & Arn.) Greene. Scouler's *Allocarya*. Fig. 4242.

Myosotis Scouleri Hook. & Arn. Bot. Beechey 370. 1840.

Allocarya Scouleri Greene, Pittonia 1: 18, as to synoptic type. 1887.

Allocarya media Piper, Contr. U.S. Nat. Herb. 22: 107. 1920.

Allocarya divaricata Piper, loc. cit.

Plagiobothrys medius I. M. Johnston, Contr. Arnold Arb. No. 3: 58. 1932.

Plagiobothrys Scouleri I. M. Johnston, Journ. Arnold Arb. 16: 192. 1935.

Stems branched at base, slender, strigose, 1–3 dm. long, erect or ascending. Leaves strigose beneath, sparingly so or glabrous above, the lower linear, the upper linear to linear-ob lanceolate; racemes simple, loosely flowered, bracted to about the middle; pedicels about 1 mm. long, or the lowest sometimes 5–10 mm. long; calyx appressed-hispidulous, usually ferruginous at apex when young; mature lobes 3–4 or rarely 5 mm. long, linear-lanceolate, erect or ascending;

nutlets ovoid or lanceolate-ovoid, 1.5–2 mm. long; dorsal side finely granulate, keeled toward the apex, ridges evident or obscure, more or less diagonal and frequently anastomosing, toward the base more or less reduced to tubercles, interspaces sparsely tuberculate; ventral side keeled almost to base, with or without ridges or wrinkles; scar ovate to elliptic, suprabasal, or on the oblique basal portion of nutlet.

Wet places, Humid Transition Zone; Vancouver Island, and the Olympic Peninsula, Washington. Type locality: "N.W. Coast, Dr. Scouler." May–July.

22. *Allocarya cognata* Greene. Cognate *Allocarya*. Fig. 4243.

Allocarya cognata Greene, Pittonia, 4: 235. 1901.

Allocarya microcalyx Brand, Rep. Spec. Nov. 19: 71. 1923.

Allocarya filicaulis Brand, op. cit. 72.

Plagiobothrys cognatus I. M. Johnston, Contr. Arnold Arb. No. 3: 59. 1932.

Stems usually branched at base, erect or spreading, 5–25 cm. long, rather finely appressed-pubescent or strigose. Leaves strigose and pustulate beneath, less so or glabrate above, the lower 2–7 cm. long, the upper shorter, often linear-spatulate; racemes simple, slender, usually loosely flowered, bracteate throughout or usually only below the middle; pedicels 1 mm. long or often less, erect or ascending; corolla 1–2 mm. broad; nutlets oblong-ovoid to broadly ovoid, about 1.5–2 mm. long, somewhat constricted and acute at apex, obtuse or rounded at base; dorsal side keeled down to about the middle or below, with irregular transverse ridges, these often reduced to scattered tuberculations or entirely absent toward the base, surface finely granulated or sometimes with glochidiate bristles; ventral side keeled down to the basal ovate scar, the sides diagonally ridged or wrinkled, especially above the middle.

Damp flats or borders of meadows, often in alkaline soils, Upper Sonoran and Arid Transition Zones; north-eastern Washington and Idaho southeast of the Cascades, through eastern Oregon to the Sierra Nevada, central California, Nevada, Utah and northern Arizona. Type locality: Cache Valley, Utah. June–Aug.

23. *Allocarya Cusickii* Greene. Cusick's *Allocarya*. Fig. 4244.

Allocarya Cusickii Greene, Pittonia 1: 17. 1887.

Allocarya ambigens Piper, Contr. U.S. Nat. Herb. 22: 96. 1920.

Allocarya insculpta Piper, op. cit. 109.

Plagiobothrys Cusickii I. M. Johnston, Contr. Arnold Arb. 3: 63. 1932.

Stems branched from the base, slender, prostrate or ascending, 5–20 cm. long, sparsely strigose. Leaves strigose beneath, the hairs pustulate at base, upper surfaces nearly or quite glabrous, the hairs often more abundant and more spreading on the margins, lower linear, 3–10 cm. long, upper shorter, linear to lanceolate; racemes solitary, slender, loosely or sometimes densely flowered, bracteate at least below the middle; pedicels 1 mm. long or less, slender; calyx finely appressed-hispidulous, only slightly accrescent in age; lobes linear or linear-lanceolate, 1.5–4 mm. long, erect or ascending; corolla 1–1.5 mm. broad; nutlets lanceolate to oblong-ovoid, 1–2 mm. long, usually abruptly angled at base; dorsal surface glossy, not granulate, keeled near the apex, with irregular more or less oblique ridges, tuberculate in the interspaces and toward the base; ventral side keeled to well below the middle, oblique toward the base and bearing the deep small scar; axial nutlet firmly attached with a broad ovate or deltoid scar.

Alkaline soils, Arid Transition and Upper Sonoran Zones; east of the Cascades in Washington and Oregon to northeastern California, east to Idaho and Nevada. Type locality: "Union County, Oregon" and "Reno, Nevada." May–Aug.

24. *Allocarya ténera* Greene. Slender *Allocarya*. Fig. 4245.

Allocarya tenera Greene, Pittonia 3: 109. 1896.

Allocarya gracilis Piper, Contr. U.S. Nat. Herb. 22: 98. 1920.

Plagiobothrys tener I. M. Johnston, Contr. Arnold Arb. No. 3: 66. 1932.

Allocarya hispidula var. *tenera* Jepson, Fl. Calif. 3: 365. 1943.

Stems branching from the base, spreading or ascending, very slender, 6–15 cm. high, sparsely and inconspicuously strigose. Basal leaves narrowly linear-oblanccolate, about 2 cm. long, 1–2 mm. broad, sparsely pustulate-setulose on the margins and midvein, stem-leaves few, narrowly linear, 5–15 mm. long; racemes bractless or bracteate only at base; pedicels, at least the lower, slender, 1–2 mm. long; corolla 3–7 mm. broad; fruiting calyx-tube distinctly 4-ribbed, the lobes erect, 1.5 mm. long, narrowly linear-lanceolate or the margins involute, strigose; nutlets ovoid about 1 mm. long, reticulate-rugulose, the ridges thin and tuberculate-roughened on the margins; interspaces finely tuberculate, ventral side diagonally rugulose, keeled above the scar, this lanceolate-ovate, extending from the base almost to the middle of the nutlet.

Wet places, mostly Upper Sonoran and Arid Transition Zones; Modoc and Shasta Counties south in the North Coast Ranges to Lake County, California. Type locality: Adams Springs, Lake County, California. May–July.

Also referable to this species are: *Allocarya laxa* Piper, Contr. U.S. Nat. Herb. 22: 98. 1920; *A. pratensis* Piper, op. cit. 99; *A. vallata* Piper, op. cit. 101; *A. scalpocarpa* Piper, op. cit. 111.



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4234. *Allocarya undulata*
 4235. *Allocarya Chorisiana*
 4236. *Allocarya lithocarya*

4237. *Allocarya figurata*
 4238. *Allocarya hirta*
 4239. *Allocarya Cooperi*

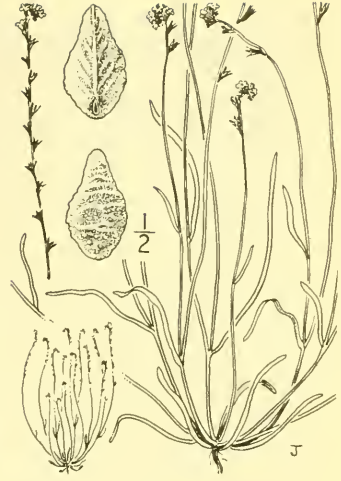
4240. *Allocarya salsa*
 4241. *Allocarya granulata*
 4242. *Allocarya Scouleri*



4243



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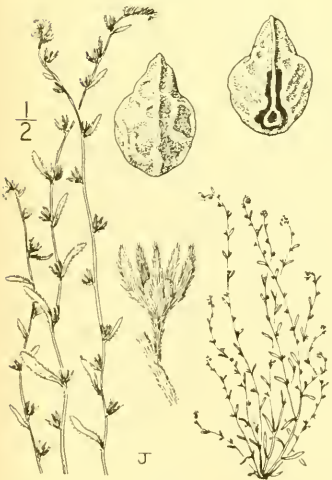
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4243. *Allocarya cognata*
4244. *Allocarya Cusickii*
4245. *Allocarya tenera*

4246. *Allocarya bracteata*
4247. *Allocarya hispida*
4248. *Allocarya trachycarpa*

4249. *Allocarya diffusa*
4250. *Allocarya californica*
4251. *Echidiocarya californica*

25. *Allocarya bracteata* Howell. Bracted *Allocarya*. Fig. 4246.

Allocarya bracteata Howell, Fl. N.W. Amer. 481. 1901.

Allocarya Leibergii Piper, Contr. U.S. Nat. Herb. 22: 95. 1920.

Allocarya conjuncta Piper, op. cit. 109.

Allocarya commixta Brand, Rep. Spec. Nov. 18: 312. 1922.

Allocarya Piperi Brand, op. cit. 19: 70. 1923.

Allocarya aculeolata Piper, Proc. Biol. Soc. Wash. 37: 94. 1924.

Allocarya charaxata var. *debilis* Brand, Pflanzenreich 4²⁵²: 165. 1931.

Plagiobothrys bracteatus I. M. Johnston, Contr. Arnold Arb. No. 3: 68. 1932.

Allocarya Cusickii var. *vallicola* Jepson, Fl. Calif. 3: 364. 1943.

Allocarya Cusickii var. *debilis* Jepson, loc. cit.

Stems branched from the base, decumbent or ascending, rarely erect, 1–4 dm. long, usually rather thinly strigose. Lower leaves linear, the lower 4–10 cm. long, the upper linear or linear-oblancoate; racemes slender and elongated in age, bracteate below; pedicels about 1 mm. long or the lowermost longer, ascending; calyx more or less accrescent; lobes lanceolate, 2–4 mm. long, ascending; corolla 1–3 mm. broad; nutlets 2 mm. or less long, oblong-ovoid; dorsal side somewhat keeled above the middle, the surface granulate, the sides with somewhat oblique transverse ridges or wrinkles, these below the middle becoming more or less obscure and often replaced by tuberculations, interspaces narrow and sparsely or not at all tuberculate; ventral side keeled to well below the middle; scar small, oblique or almost basal, ovate to elliptic or cuneate, concave, surrounded by an irregular ridge.

Dry beds of pools and ditches, Upper Sonoran and Transition Zones; Douglas County, Oregon, southward west of the Cascades and the Sierra Nevada to northern Lower California. A common and variable species. Type locality: "In wet places, Umpqua Valley Oregon." April–June.

26. *Allocarya hispidula* Greene. Harsh *Allocarya*. Fig. 4247.

Allocarya hispidula Greene, Pittonia 1: 17. 1887.

Allocarya penicillata Greene, op. cit. 18.

Plagiobothrys hispidulus I. M. Johnston, Contr. Arnold Arb. No. 3: 71. 1932.

Stems branching from the base, prostrate or loosely ascending, 5–40 cm. long, strigose. Leaves appressed-hispidulous, the hairs somewhat pustulate, the upper surface sometimes glabrate; lower linear, the upper linear or linear-oblancoate; racemes slender, usually elongated and loosely flowered in age, leafy-bracted at least to the middle; pedicels 1 mm. long or the lowermost sometimes 5–10 mm. long; calyx more or less accrescent in age, strigose or appressed-hispidulous; lobes linear to narrowly lanceolate, 2–3 mm. long, rarely less, ascending; corolla 1–2 mm. broad; nutlets 1.5–2 mm. long, ovoid to ovoid-lanceolate, abruptly rounded and somewhat angulate at base; dorsal side keeled above the middle, rather closely and obliquely transverse-ridged, the ridges often anastomosing, both the keel and the ridges often muriculate and frequently dentate with papillae, or with minute hyaline more or less branched hairs, lateral angles keeled; ventral side keeled and angulate to below the middle; scar linear-oblong, lateral usually concave, encircled by a ridge.

Moist meadows or flats, Canadian and Transition Zones; Washington mostly east of the Cascades to Idaho, south to Oregon both west and east of the Cascades, and California in the North Coast Ranges and Sierra Nevada to the San Bernardino Mountains, California. June–August.

Other proposed species referable here are: *Allocarya cryocarpa* Piper, Contr. U.S. Nat. Herb. 22: 98. 1920; *A. cervina* and *A. ramosa* Piper, op. cit. 100; *A. nigra* Brand, Rep. Spec. Nov. 19: 71. 1923.

27. *Allocarya trachycarpa* (A. Gray) Greene. Rough-fruited *Allocarya*. Fig. 4248.

Krynitzkia trachycarpa A. Gray, Proc. Amer. Acad. 20: 266. 1885.

Allocarya trachycarpa Greene, Pittonia 1: 14. 1887.

Allocarya interrasilis Piper, Contr. U.S. Nat. Herb. 22: 108. 1920.

Plagiobothrys trachycarpus I. M. Johnston, Contr. Gray Herb. No. 68: 78. 1923.

Stems much-branched at the base, prostrate or laxly ascending, strigose, 5–45 cm. long. Basal leaves linear, 5–10 cm. long, the upper oblanceolate to linear-oblancoate, 1–2 cm. long; strigose-hispidulous below and on the margin, glabrate above; racemes becoming very loosely flowered, bracteate throughout with foliaceous bracts; pedicels 1 mm. long or less, ascending; mature calyx more or less accrescent, strigose; lobes linear to linear-lanceolate, 1.5–3 mm. long, ascending or somewhat spreading, usually rusty-pubescent at tip; corolla 1–2.5 mm. broad; nutlets ovoid and somewhat angulate, about 2 mm. long; dorsal side distinctly keeled to the middle or beyond, also keeled on the angles, transverse ridges more or less parallel, narrow and frequently tuberculate or papillate-dentate, interspaces usually broad and tuberculate; ventral side with a prominent keel; scar distinct, lateral, broad and much-expanded, concave, surrounded by a prominent ridge.

Meadows and desiccated lands, Upper Sonoran Zone; California Coast Ranges from Contra Costa and San Joaquin Counties to Los Angeles County. Type locality: probably near Walnut Creek, Contra Costa County, according to Johnston (Contr. Arnold Arb. No. 3: 76. 1932.) May–July.

28. *Allocarya diffusa* Greene. Diffuse *Allocarya*. Fig. 4249.

Allocarya diffusa Greene, Pittonia 1: 14. 1887.

Plagiobothrys diffusus I. M. Johnston, Contr. Arnold Arb. No. 3: 77. 1932.

Very closely resembling *A. trachycarpa* in habit, and differing only in its nutlets, these

broadly ovoid, about 1.5 mm. long and 1 mm. broad; dorsal side conspicuously convex, keeled to the middle or lower, ridges somewhat irregular and reticulately joined, interspaces small and distinctly tuberculate; ventral side with the prominent ridge surrounding the scar prolonged upward along the keel forming a groove for the latter up the middle; scar lateral with the expanded margins strongly upturned, thus appearing narrow and deeply convex.

Heavy soils in the vicinity of Mountain Lake in the Presidio, San Francisco. A local endemic closely related to *A. trachycarpa* and *A. Californica*. April-June.

29. *Allocarya californica* (Fisch. & Mey.) Greene. California *Allocarya*.
Fig. 4250.

Myosotis californica Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 42. 1835.

Allocarya californica Greene, Pittonia 1: 20. 1887.

Allocarya scalpta Piper, Contr. U.S. Nat. Herb. 22: 104. 1920.

Allocarya areolata Piper, op. cit. 105.

Allocarya reticulata Piper, loc. cit.

Allocarya dispar Piper, op. cit. 109.

Plagiobothrys reticulatus var. *rossianorum* I. M. Johnston, Contr. Arnold Arb. No. 3: 79. 1932.

Stems usually much-branched at base, slender, decumbent or spreading, 1-3 dm. long, strigose. Leaves appressed-hispidulous, lower linear to linear-spatulate, upper narrowly oblong or somewhat oblong-oblancheolate; racemes slender, simple, elongated in age, leafy-bracteate toward the base; calyx appressed-hispidulous; lobes linear to lanceolate, 2.5-4 mm. long; corolla 1.5-3 mm. broad; nutlets ovoid, 0.6-1 mm. long and half as broad; dorsal side convex, keeled only near the apex, ridges low and rounded, anastomosing, the interspaces thickly and finely granulate, tubercles wanting or sparse and obscure; ventral side strongly keeled; scar small, elliptic to ovate, concave, ridge surrounding it with the ends prolonged above it, forming distinct ridges along either side of the keel to about the middle.

Damp depressions, Humid Transition Zone; coastal valleys from Coos Bay, Oregon, to Marin County, California. Type locality: Fort Ross, Sonoma County, California. May-July.

Allocarya californica var. *minuta* (Piper) Jepson & Hoover in Jepson, Fl. Calif. 3: 363. 1943. (*Allocarya minuta* Piper, Contr. U.S. Nat. Herb. 22: 104. 1920.) Stems 1 to several, erect, simple or branched; calyx 1.5-2 mm. long; corolla 3.5-4 mm. broad; nutlets smaller, 1 mm. long or less, finely and sparsely granulate in the interspaces. Humboldt Bay region, California. Type locality: Fort Seward, Humboldt County, California.

18. *ECHIDIOCARYA* A. Gray in Benth. & Hook. Gen. Pl. 2: 854. 1876.

Annual, usually diffusely branched herbs with the lowest leaves opposite, the others alternate. Flowers in slender spikes, bracteate or the upper bractless. Calyx parted to the base or nearly so, the lobes linear-lanceolate. Corolla white, the throat not crested. Nutlets 4, incurved, rugulose-muriculate dorsally, conspicuously keeled ventrally; scar elevated on a prominent cylindrical stipe. [Name Greek, meaning a diminutive viper and nutlet, in reference to the peculiar shape of the stipe.]

A genus of three species, two in southwestern United States and adjacent Mexico, and one in Chile. Type species, *Echidiocarya californica* A. Gray.

1. *Echidiocarya californica* A. Gray. California *Echidiocarya*. Fig. 4251.

Echidiocarya californica A. Gray, Proc. Amer. Acad. 12: 164. 1877.

Plagiobothrys cooperi A. Gray, op. cit. 20: 285. 1885.

Plagiobothrys californicus Greene, Bull. Calif. Acad. 2: 407. 1887.

Plagiobothrys allocaryoides Brand ex Fedde, Rep. Spec. Nov. 20: 47. 1924.

Allocaryastrum californicum Brand, Pflanzenreich 4²²: 100. 1931.

Stems several to many from the base, decumbent or prostrate, slender, 1-4 dm. long, often diffusely branched, hirsute with spreading hairs. Leaves often numerous below, the lower oblanceolate, 1-2 cm. long, 2-5 mm. wide, rounded or obtuse at apex, rather thinly hirsute with ascending hairs or sometimes canescent with an appressed pubescence; upper stem-leaves and lower floral bracts mostly lanceolate or linear-lanceolate or sometimes narrowly oblong; spikes slender, at length elongated and remotely flowered, often bractless above the middle; calyx 3 mm. long in fruit, lobed to the base, the lobes linear-lanceolate, hirsute and sparingly hispid; corolla 4-6 mm. broad; nutlets usually 4, ovoid, 1.5 mm. long; dorsal keel thin above, reduced to a mere line and fading out a little below the middle of the nutlet, rugae irregular, raised and thin or reduced to lines, often muriculate; scar a short stipe near the base of the akene, the ventral surface sharply angled with a thin median keel.

Grassy slopes and mesas, Upper Sonoran Zone; South Coast Ranges at Vancouver Pinnacles, San Benito County and Estrella, San Luis Obispo County; Pampa, Kern County, and in cismontane southern California from Santa Barbara and San Bernardino Counties south to San Diego County, California. Type locality: "San Bernardino Co." Feb.-May.

Echidiocarya californica subsp. *gracilis* (Brand) Abrams. (*Plagiobothrys californicus* var. *gracilis* I. M. Johnston, Contr. Gray Herb. No. 68: 73. 1923; *Allocaryastrum gracile* Brand, Pflanzenreich 4²²: 100. 1931.) Stems very slender, hispidulous with spreading hairs; leaves linear-lanceolate, 2-2.5 mm. wide, acute or acutish; calyx-lobes very narrow; corolla 1.5-2 mm. broad; nutlets 1-1.5 mm. long. Vicinity of San Diego south to northern Lower California; and on the following Channel Islands: Santa Cruz, San Clemente and Santa Catalina. Type locality: San Diego.

Echidiocarya californica subsp. *fulvescens* (Brand) Abrams. (*Plagiobothrys californicus* var. *fulvescens* I. M. Johnston, Contr. Gray Herb. No. 68: 74. 1923; *Allocaryastrum ursinum* var. *fulvescens* Brand, Pflanzen-

reich 4252: 101. 1931.) Stems slender, elongated, prostrate, herbage short hispid-pubescent when young; leaves oblanceolate, 3–5 mm. wide; spikes very slender, elongated and remotely flowered; corolla about 2 mm. broad. Mostly in foothills and mountains near the coast from the Santa Ynez Mountains, Santa Barbara County to northern Lower California; also on Santa Rosa, Santa Catalina and Anacapa Islands. Type locality: Santa Barbara, California.

Echidiocarya californica var. *ursina* Jepson, Fl. Calif. 3: 370. 1943. (*Echidiocarya ursina* A. Gray, Proc. Amer. Acad. 19: 90. 1883; *Plagiobothrys californicus* var. *ursinus* I. M. Johnston, Contr. Gray Herb. No. 68: 74. 1923.) Dense and compact with stout much-branched stems 2–8 cm. long; spikes short; flowers concealed by the leaves and bracts; corolla 1.5–2 mm. broad. Sandy or gravelly soils, San Bernardino and San Jacinto Mountains, southern California. Type locality: Bear Valley, San Bernardino Mountains.

19. PLAGIOBÓTHRYS Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 46. 1835.

Slender, glabrate or mostly soft-pubescent, annual or perennial herbs. Leaves mostly linear or linear-lanceolate, alternate above and either opposite at base or forming a rosette. Flowers in bractless or bracteate spike-like racemes, the racemes more or less scorpioid and usually elongated in fruit. Pedicels persistent, short or sometimes almost obsolete. Corolla small, white, salverform, with crests or processes at the mouth of the throat. Nutlets narrowly to broadly ovoid, erect or incurved.

A genus of about 50 species, mainly inhabiting western United States and Chile. Type species, *Plagiobothrys rufescens* Fisch. & Mey.

Caruncle of nutlet elongated, extending along the crest of the ventral keel; nutlets trigonous.

I. *Amsinckiopsis*.

Caruncle of nutlet orbicular or nearly so, sunken in transverse groove at base of ventral keel.

Inflorescence glomerate; caruncle at or above the middle of the nutlet; basal leaves not persisting in fruit; caruncle fragile.

II. *Sonnea*.

Inflorescence racemose and elongate in age; basal leaves forming a persistent rosette; caruncle cartilaginous.

III. *Euplagiobothrys*.

I. *Amsinckiopsis*.

Corolla 4–7 mm. broad; nutlets irregularly rugose.

1. *P. Kingii*.

Corolla 1–2.5 mm. broad; nutlets conspicuously tessellate.

2. *P. Jonesii*.

II. *Sonnea*.

Represented by a single species.

3. *P. hispidus*.

III. *Euplagiobothrys*.

Calyx circumscissile, in age less than 4 mm. long; lobes usually connivent over fruit; nutlets usually only 1 or 2 maturing; midrib and margin of leaves purple-stained.

Flowers in a simple bracteate raceme; corolla 3 mm. broad; nutlets strongly arched in lateral outline.

4. *P. arizonicus*.

Flowers in usually furcate-branched racemes, bracts wanting or sometimes 1 or 2 at base of racemes; nutlets not strongly arched in lateral outline.

5. *P. nothofulvus*.

Calyx not circumscissile or if so strongly accrescent and over 4 mm. long, erect or spreading; mature nutlets usually 4.

Bristles of calyx-lobes uncinat.

6. *P. uncinatus*.

Bristles of calyx-lobes not uncinat.

Nutlets with a conspicuous annular caruncle, 2.3–3.3 mm. long; corolla-tube longer than calyx; not purple-stained.

Racemes bractless; areolae on dorsal surface of nutlet regular and rectangular, and dorsal keel not winged.

7. *P. campestris*.

Racemes bracteate; dorsal side of nutlet not areolate, or rugose-curved or interrupted forming irregular areolae.

8. *P. infectivus*.

Nutlets with a solid caruncle, less than 2.3 mm. long.

Transverse dorsal rugae of nutlets very thin and sharp, enclosing polygonal granulate areolae.

9. *P. canescens*.

Transverse dorsal rugae low and broad, separated by shallow lineate grooves.

Nutlets ovoid, usually constricted only at apex, the base rounded or sometimes slightly constricted; plant conspicuously purple-stained.

10. *P. Torreya*.

Nutlets cruciform, being abruptly and equally constricted at apex and base, shining; plants little or not at all purple-stained.

Spikes bracteate; calyx nearly as broad as long; stems 1 or few from the base, stout.

11. *P. shastensis*.

Spikes bractless or with bract only at base; calyx about half as broad as long; stems usually many from base.

12. *P. tenella*.

1. *Plagiobothrys Kingii* (S. Wats.) A. Gray. King's Popcorn Flower. Fig. 4252.

Eritrichium Kingii S. Wats. Bot. King. Expl. 243. pl. 23. figs. 3–5. 1871.

Plagiobothrys Kingii A. Gray, Proc. Amer. Acad. 20: 281. 1885.

Sonnea Kingii Greene, Pittonia 1: 23. 1887.

Stems 1 to several, erect or ascending, 1–4 dm. high, bristly-hirsute with spreading hairs. Basal leaves linear-oblanceolate, the cauline linear, 3–6 cm. long, the short floral ones usually lanceolate, hirsute with sparsely or slightly ascending hairs; flowers in short dense spikes, these becoming elongate and loosely flowered in fruit; calyx-lobes 4–6 mm. long, rather stiffly hirsute on the margins and apex, and also bearing stout straight straw-colored bristles; corolla 4–7 mm. broad; nutlets 4, cuneate-ovoid, acute and incurved at apex, dorsal side with low keel and with similar keel on the lateral angles, the transverse rugae irregular, forming rather broad papillate areolae; scar elongate and keel-like, medial.

Sandy deserts, Upper Sonoran Zone; western Nevada and Inyo County, California, east to Utah. Type locality: "Truckee Pass and in the Trinity [Virginia] Mountains, Nevada; 4,500–6,000 feet altitude." May–June.

Plagiobothrys Kingii var. *Harknessii* (Greene) Jepson, Man. Fl. Pl. Calif. 856. 1925. (*Sonnea Harknessii* Greene, Pittonia 1: 23. 1887; *Plagiobothrys Harknessii* Nels. & Macbr. Bot. Gaz. 62: 143. 1916.) Racemes short and conglomerate, or a few scattering ones loosely flowered and longer; scar of nutlet elongated and extending nearly the whole length of the ventral keel. Southeastern Oregon, Malheur County, south through western Nevada to Mono Lake and Owens Lake, California. Type locality: Mono Lake, California.

2. *Plagiobothrys Jonesii* A. Gray. Jones' *Plagiobothrys*. Fig. 4253.

Plagiobothrys Jonesii A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 430. 1886.

Sonnea Jonesii Greene, Pittonia 1: 23. 1887.

Stems erect, 1 to several from the base, divergently branched, 1-3 dm. high, hispid with spreading bristly hairs pustulate at base, and also retrorse-puberulent. Basal leaves linear or narrowly oblanceolate, cauline mostly lanceolate with pubescence similar to stem but thinner; racemes terminating the branches, mostly conspicuously leafy-bracted at base, 1.5-3 cm. long, the lower leaves of the branches often bearing one or few axillary flowers; calyx-lobes subulate-linear, 6-8 mm. long; corolla 1-2 mm. broad; nutlets 3 mm. long, incurved and 4-angled by the dorsal and ventral keels and the 2 lateral ridges, abruptly pointed at apex, the keel and lateral angles tuberculate, the concave surface between densely tessellate; scar narrow or medial-narrow merging into the keel above, and with a diverging lateral ridge extending to either side.

Washes and rocky slopes of the deserts, Sonoran Zones, Inyo County south to the Whipple Mountains, San Bernardino County, California. Type locality: Needles, California. April-May.

3. *Plagiobothrys hispidus* A. Gray. Bristly Popcorn Flower. Fig. 4254.

Plagiobothrys hispidus A. Gray, Proc. Amer. Acad. 20: 286. 1885.

Sonnea hispida Greene, Pittonia 1: 22. 1887.

Stems solitary and few-branched above, to several and much-branched, 5-20 cm. high, hispid and sparsely tomentulose. Leaves hispid with ascending hairs slightly pustulate at base, the surface green and without finer pubescence, lower linear, 1.5-2.5 cm. long, upper lanceolate, sometimes broadly so, 0.5-2 cm. long, obtuse; flowers in small terminal glomerate clusters and also sometimes solitary in the axils; calyx-lobes lanceolate, somewhat closed over the nutlets, about 2 mm. long; corolla 1 mm. broad; nutlets usually solitary, only 1 mm. long, ovoid, tuberculate, strongly ribbed dorsally and on the angles; scar a little above the middle tapering into the sharp keel above, the ventral surface densely tuberculate below the scar, nearly smooth above.

Sandy and gravelly soils, Arid Transition and Canadian Zones; Deschutes County, Oregon, southward east of the Cascades and the Sierra Nevada, to Mono County, California, and western Nevada. Type locality: Truckee, California. June-Aug.

4. *Plagiobothrys arizonicus* (A. Gray) Greene. Arizona Popcorn Flower. Fig. 4255.

Eritrichium canescens var. *arizonicum* A. Gray, Proc. Amer. Acad. 17: 227. 1882.

Plagiobothrys arizonicus Greene ex A. Gray, op. cit. 20: 284. 1885.

Stems slender, several from the base, ascending, simple or few-branched, 1-4 dm. high, hirsute-hispid with spreading hairs and also rather sparingly villous-pubescent. Leaves hirsute-hispid with more or less appressed hairs, pustulate at base, without shorter pubescence, the lower linear-oblanceolate, 1.5-5 cm. long, upper linear-oblong to lanceolate; roots, lower parts of stems and veins of the leaves, or sometimes the whole plant, purplish; spikes at length elongated, remotely flowered and bractless or with a few foliaceous bracts; calyx about 3 mm. long, cleft to about the middle, lobes narrow-attenuate, connivent, hirsute-hispid, the tube at length usually circumscissile near the base; corolla 2-2.5 mm. broad; nutlets 1-4 commonly 2, ovoid and abruptly acute at apex, median and lateral keels often tuberculate, and with connecting transverse rugae, the arolae between smooth or minutely papillate; scar median, seated in a sunken area at the base of the keel.

Gravelly or sandy soils, Upper Sonoran Zone; Inner Coast Ranges and San Joaquin Valley, south to the Tehachapi Mountains, and mostly on the desert slopes to San Diego County, California, east to New Mexico and Sonora. Type locality: "Arizona, Greene, Pringle." March-June.

Plagiobothrys arizonicus var. *catalinensis* A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 431. 1886. (*Plagiobothrys canescens* var. *catalinensis* Jepson, Man. Fl. Pl. Calif. 856. 1925; *P. catalinensis* J. F. Macbride, Proc. Amer. Acad. 51: 546. 1916.) Closely resembling the typical species but calyx-lobes variable on the same plant, some distinctly connivent over the mature nutlets, others on another branch of the same plant only slightly connivent, suggesting a possible hybrid origin between *P. canescens* and *P. arizonicus*. Santa Catalina and San Clemente Islands, California. Type locality: "Santa Catalina Island, off Los Angeles, California."

5. *Plagiobothrys nothofulvus* A. Gray. Rusty Popcorn Flower. Fig. 4256.

Eritrichium nothofulvum A. Gray, Proc. Amer. Acad. 17: 227. 1882.

Plagiobothrys nothofulvus A. Gray, op. cit. 20: 285. 1885.

Stems 1 to several from the base, erect or ascending, 2-4 dm. high, villous-tomentose with spreading hairs. Basal leaves oblanceolate, 3-10 cm. long, 5-15 mm. wide, acute at apex, sparsely villous, cauline leaves few, linear-lanceolate; roots, bases of the stems and the margins and midrib of the leaves purple-stained; spikes on terminal once- or twice-forked branches, usually without foliaceous bracts, at length elongated and loosely flowered; calyx densely appressed-hirsute, the hairs, especially on the lobes, rusty-colored, 2-3 mm. long in fruit, the lobes erect about as long as the tube, this at length circumscissile near the base; corolla 6-8 mm. broad;

mature nutlets varying from 1-4 but usually 3, orbicular-ovoid, abruptly constricted into an acute beak-like apex, median dorsal keel and lateral ones usually prominent, transverse rugae 4 or 5, the intervals rectangular, minutely papillate; scar annular, median at the base of the narrow ventral keel.

Grassy fields and hillsides, Upper Sonoran Zone; Klickitat County, Washington, and Wasco County, Oregon, southward mostly west of the Cascades to San Diego County and east to the Providence Mountains, California. Type locality: California. Collected by Douglas. March-May.

Plagiobothrys myosotoides (Lehm.) Brand, Pflanzenreich 4²²: 108. 1931. (*Lithospermum tinctorium* Ruiz & Pavon, Fl. Peruv. 2: 4. pl. 114. fig. 6. 1799. Not L. 1753; *L. myosotoides* Lehm. Asperif. 319. 1818; *Plagiobothrys tinctorius* A. Gray, Proc. Amer. Acad. 20: 283. 1885.) In habit much like *P. Torreyi* but the sculpturing of the nutlets more like that of *P. tenellus*; strongly keeled dorsally and also with ridges separated by broad intervals that are sometimes papillate, not shining. A Chilean species of which only two collections have been reported from California: ridge between Isabel Valley and Arroyo Bayo, Mount Hamilton Range, and Big Sandy Valley, Black Mountain, Fresno County.

6. *Plagiobothrys uncinatus* J. T. Howell. Hooked Popcorn Flower. Fig. 4257.

Plagiobothrys uncinatus J. T. Howell, Leaflets West. Bot. 2: 255. 1940.

Stems usually several from the base and bushy-branched, 8-30 cm. high, reddish, thinly hirsute with spreading hairs, without finer pubescence. Basal leaves linear-oblong, 2-2.5 cm. long including the petiole, 3-4 mm. wide, hispidulous, cauline leaves oblong-ovate to narrowly ovate, 3-10 mm. long; flowers scattered along the stems and solitary in the leaf-axils, also in small terminal clusters, subsessile; calyx divided almost to base, densely uncinately-bristly, lobes about 1 mm. long in anthesis, 2-2.5 mm. in fruit; corolla 1.5 mm. long, about 1 mm. broad; nutlets 1-1.3 mm. long, somewhat quadrate, rounded at base, abruptly pointed at apex, the dorsal side slightly keeled toward the apex, transversely rugulose and tuberculate, the ventral side narrowly keeled above the middle.

Slopes of canyons, Upper Sonoran Zone; Gabilan and Santa Lucia Mountains, California. Type locality: Santa Lucia Camp, Santa Lucia Mountains, Monterey County. April-May.

7. *Plagiobothrys campestris* Greene. Fulvous Popcorn Flower. Fig. 4258.

Plagiobothrys californicus Greene, Pittonia 2: 231. 1892. Not Greene, Bull. Calif. Acad. 2: 407. 1887.

Plagiobothrys campestris Greene, Pittonia 2: 282. 1892.

Plagiobothrys rufescens var. *campestris* Jepson, Fl. W. Mid. Calif. 446. 1901.

Plagiobothrys fulvus var. *campestris* I. M. Johnston, Contr. Gray Herb. No. 68: 70. 1923.

Stem solitary or rarely 2 or more from the base, 3-6 dm. high or the branches sometimes spreading and more or less decumbent, villous-hirsute with spreading hairs, and sparsely tomentose. Leaves hirsute with appressed hairs on both surfaces and spreading ones on the margins, the basal spatulate-oblongate, the cauline sessile and linear, the lower 3-5 cm. long, the upper gradually shorter; spicate racemes loosely flowered, often 3-4 dm. long; calyx often fulvous when young, the lobes lanceolate, about 5 mm. long and erect in fruit; corolla 3-4 mm. broad; nutlets 2.5-3 mm. long, triangular-ovoid, short-acuminate, dorsal side thin-keeled, the median keel extending over the apex, transverse rugae usually several or sometimes nearly obsolete; scar annular.

Open valleys and foothills, Upper Sonoran Zone; Umpqua Valley, western Oregon, southward west of the Cascade-Sierra Nevada Divide, to Santa Clara County in the Coast Ranges and to the foothills of the Sierra Nevada, Fresno County, California. Type locality: "Interior California." March-May.

8. *Plagiobothrys infectivus* I. M. Johnston. Dye Popcorn Flower. Fig. 4259.

Plagiobothrys infectivus I. M. Johnston, Journ. Arnold Arb. 20: 380. 1939.

Stem solitary and erect or several from the base and spreading, 2-4 dm. long, villous-hirsute with spreading hairs or somewhat retrorse; root, lower part of stem, midvein and margin of leaves purple-stained. Leaves linear, 2-8 cm. long, nearly glabrous beneath, appressed-hirsute above; spikes 10-20 cm. long, loosely flowered, leafy-bracteate throughout; calyx cleft to the base into broadly lanceolate acuminate lobes, 5-7 mm. long, rusty-hirsute when young, midvein purple-stained; corolla slightly exerted, 3 mm. broad, often rose-colored in drying; mature nutlets usually 4, broadly ovoid, 3-3.5 mm. long, abruptly constricted into a short acute apex; median keel thin, prominent at least on the acute beak, lateral keels distinct on the beak but sometimes obscure on the body, ventral keel prominent above the median scar, this raised and annular, dorsal surface tuberculate, with few or no rugae, the ventral surface with several irregular rugae.

Usually in adobe soils, on open hills, Upper Sonoran Zone; Inner Coast Ranges especially on the eastern side, from Colusa County to San Luis Obispo County, California. Type locality: Hospital Canyon, western San Joaquin County. March-May.

9. *Plagiobothrys canescens* Benth. Valley Popcorn Flower. Fig. 4260.

Plagiobothrys canescens Benth. Pl. Hartw. 326. 1849.

Eritrichium canescens A. Gray, Proc. Amer. Acad. 10: 53. 1874.

Plagiobothrys microcarpa Greene, Pittonia 1: 21. 1887.

Stems usually with several branches from or near the base, ascending or more commonly decumbent and widely spreading, villous-tomentose throughout. Leaves linear or the basal linear-oblongate, 1.5-5 cm. long; spikes elongated and loosely flowered in age, bracteate; fruiting calyx 4-6 mm. long, densely villous-hirsute, cleft to below the middle, the lobes erect or rarely curved over the nutlets, broadly lanceolate, somewhat acuminate at apex; corolla about 3 mm. broad; nutlets usually 4, orbicular-ovoid, constricted above into a short beak-like

apex, 2 mm. long, strongly incurved, transverse rugae usually prominent, forming rectangular finely papillate intervals; scar medial, annular, and usually slightly raised.

Plains and hillsides, in gravelly adobe or even alkaline soils, Upper Sonoran Zone; Sierra Nevada foothills, Siskiyou County, Sacramento Valley and the South Coast Ranges from Contra Costa County, southward to San Diego County and the Channel Islands, California. Type locality: "In arenosis vallis Sacramento." Collected by Hartweg on his trip from Sacramento to Chico. March-May.

10. *Plagiobothrys Torreyi* A. Gray. Torrey's Popcorn Flower. Fig. 4261.

Eritrichium Torreyi A. Gray, Proc. Amer. Acad. 10: 58. 1874.

Plagiobothrys Torreyi A. Gray, Proc. Amer. Acad. 20: 284. 1885.

Cryptantha Torreyi Rydb. Mem. N.Y. Bot. Gard. 1: 331. 1900.

Plagiobothrys Torreyi var. *diffusa* I. M. Johnston, Contr. Gray Herb. No. 68: 71. 1923.

Stems slender, 1 to several from the base, sometimes few-branched and erect or ascending but usually diffusely branched and decumbent, 5–20 cm. long, hirsute with spreading hairs. Leaves linear-oblong to oblong or the uppermost oblong-ovate, sessile, 5–20 mm. long, the basal narrowed at base often longer, green, rather sparsely hirsute-hispid on both sides; flowers solitary in the axils of foliaceous bracts; calyx 2.5 mm. long in fruit, hirsute and sparsely hispid; corolla 1.5–2 mm. long, equaling or exceeding the calyx-lobes; nutlets shining, broadly ovoid, abruptly pointed at apex, keeled on the back but faintly so below the middle, the sides with about 7 low ridges with narrow sinuses between them, smooth or with few scattering whitish tubercles.

Usually in moist soils, open woods or edges of mountain meadows, Arid Transition and Canadian Zones; central and southern Sierra Nevada and San Bernardino Mountains, California. Type locality: Yosemite Valley. May–Aug.

11. *Plagiobothrys shastensis* Greene. Shasta Popcorn Flower. Fig. 4262.

Plagiobothrys shastensis Greene ex. A. Gray, Proc. Amer. Acad. 20: 285. 1885.

Stems erect, 1 to few arising from the tuft of basal leaves, simple or branching above, 1–3 dm. high, pilose. Basal leaves linear-oblancoate, 1–3 cm. long, rather thinly appressed-hirsute above, or rather densely so near the margin, the hairs pointed at apex, pustulate at base, lower surface glabrous or nearly so; cauline leaves linear, sessile, 5–10 mm. long, rather densely appressed-hirsute; spikes often geminate, loosely flowered, 1–10 cm. long, bracteate throughout; calyx cleft to the middle, about 4 mm. long in flower, 6–7 mm. in fruit, hirsute, often ferruginous when young; corolla 2.5 mm. broad, lobes 1 mm. long, ascending; nutlets broadly ovoid, somewhat 4-angled, abruptly acute, 2–2.5 mm. long, shining, keeled on the back and on the lateral angles, the intervals between the keels marked by broad flat transverse ridges separated by narrow line-like grooves.

Open hillsides and gravelly flats or washes, Upper Sonoran and Arid Transition Zones; a rather uncommon species occurring on both sides of the Cascades, southern Oregon to northern Inner Coast Ranges and Sierra Nevada, foothills to Merced County, California. Type locality: "California, in valley at the base of Mount Shasta, E. L. Greene, coll. 1876." An apparent duplicate of the type in the Dudley Herbarium is labelled in Greene's handwriting "Shasta River, Siskiyou Co. June 10, 1876." May–July.

12. *Plagiobothrys tenellus* (Nutt.) A. Gray. Slender Popcorn Flower. Fig. 4263.

Myosotis tenella Nutt. ex Hook. Kew Journ. Bot. 3: 295. 1851.

Plagiobothrys tenellus A. Gray, Proc. Amer. Acad. 20: 283. 1885.

Plagiobothrys parvulus Greene, Pittonia 3: 261. 1898.

Plagiobothrys asper Greene, op. cit. 262.

Plagiobothrys echinatus Greene, loc. cit.

Plagiobothrys colorans Greene, loc. cit.

Plagiobothrys humifusus M. E. Jones, Contr. West. Bot. No. 13: 7. 1910.

Plagiobothrys tenellus var. *parvulus* subvar. *humifusus* Brand, Pflanzenreich 4²⁶²: 108. 1931.

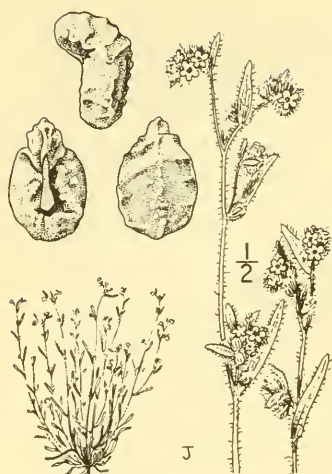
Stems slender, erect, freely branching from the base or sometimes simple, 5–25 cm. high, soft-villous with spreading and reflexed hairs. Leaves of the basal rosette oblong-lanceolate or oblong-oblancoate, obtuse or acutish, villous, 1–2.5 cm. long, cauline distinct, the lower ones linear-oblong, the upper becoming lanceolate or ovate-lanceolate, gradually reduced in size; spikes elongated in age and loosely flowered, only the lowest flowers bracteate; calyx densely short-villous with whitish or more often rufous hairs, about 3 mm. high in age; corolla-limb about 2–3 mm. broad; nutlets 1.5–2 mm. long, thick-cruciform, light-colored, sharply ridged dorsally and on the margins, the ridges commonly tuberculate.

Grassy slopes and meadows, Arid Transition and Upper Sonoran Zones; British Columbia and Idaho south to northern Lower California, Utah and Arizona. Type locality: "Sunny rocky slopes of the mountains along the valley of Coeur d'Alene River," Idaho. March–June.

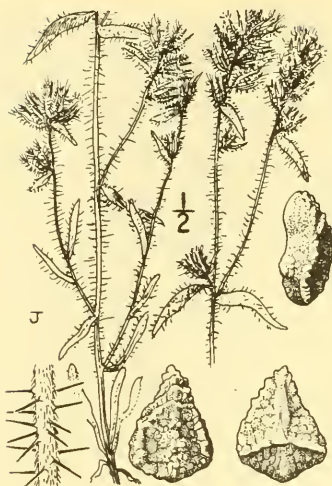
20. *EREMOCARYA* Greene, Pittonia 1: 58. 1887.

Small, hirsute-canescens, densely branched annual, the root imparting a deep purple stain. Leaves forming a rosulate basal tuft, the numerous racemose branches repeatedly dichotomous and leafy-bracted. Flowers in dense leafy-bracted racemes, with short filiform pedicels. Calyx 5-parted to the base, campanulate in fruit and persistent. Corolla white. Style persistent, becoming enlarged in fruit and broader than the capitate stigma. Gynobase columnar and simulating the style. Nutlets 4, erect and uniform, attached their whole length; groove open, little dilated at base. [Name Greek, meaning desert and nutlet.]

A monotypic genus of the arid southwestern United States and northwestern Mexico.



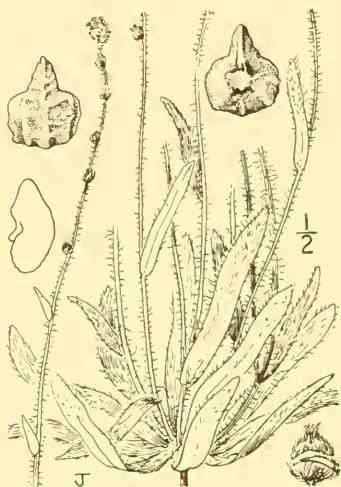
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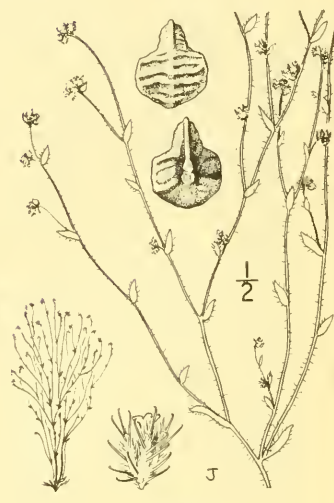
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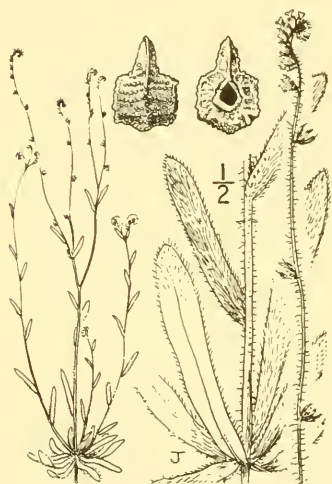
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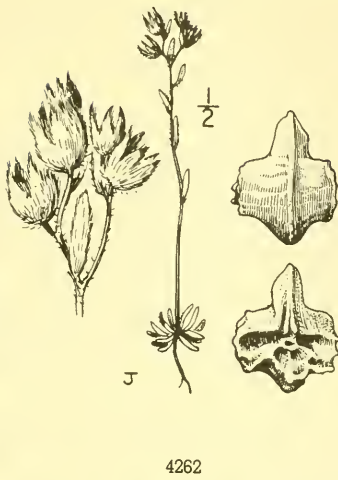
4252. *Plagiobothrys Kingii*
 4253. *Plagiobothrys Jonesii*
 4254. *Plagiobothrys hispidus*

4255. *Plagiobothrys arizonicus*
 4256. *Plagiobothrys nothofulvus*
 4257. *Plagiobothrys uncinatus*

4258. *Plagiobothrys campestris*
 4259. *Plagiobothrys infectivus*
 4260. *Plagiobothrys canescens*



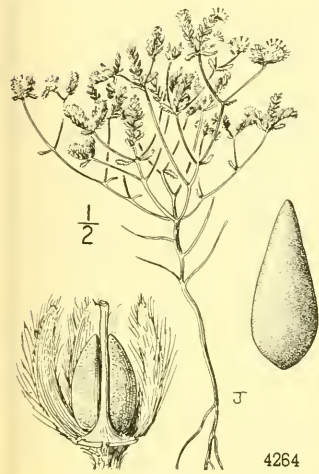
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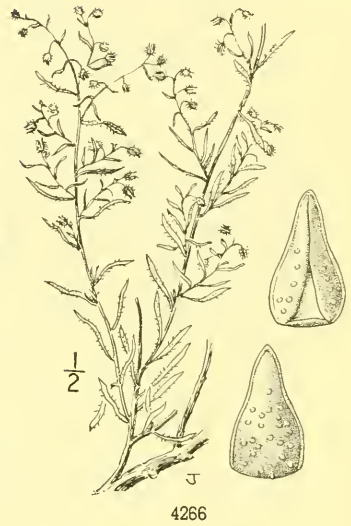
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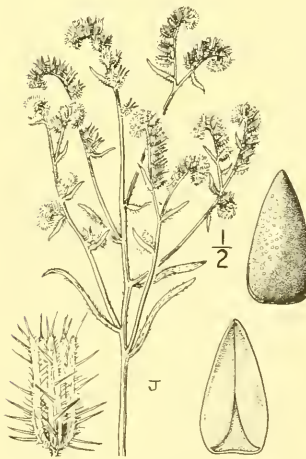
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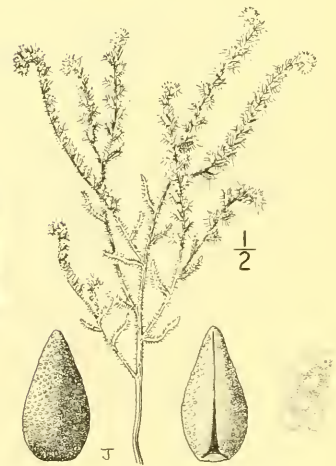
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4261. *Plagiobothrys Torreyi*
 4262. *Plagiobothrys shastensis*
 4263. *Plagiobothrys tenellus*

4264. *Eremocarya micrantha*
 4265. *Cryptantha holoptera*
 4266. *Cryptantha racemosa*

4267. *Cryptantha inaequata*
 4268. *Cryptantha costata*
 4269. *Cryptantha angustifolia*

1. *Eremocarya micrantha* (Torr.) Greene. *Eremocarya*. Fig. 4264.*Eritrichium micranthum* Torr. Bot. Mex. Bound. 141. 1859.*Krynitzkia micrantha* A. Gray, Proc. Amer. Acad. 20: 275. 1885.*Eremocarya micrantha* Greene, Pittonia 1: 59. 1887.*Cryptantha micrantha* I. M. Johnston, Contr. Gray Herb. No. 68: 56. 1923.

Annual, the root and usually the lower part of the stems purple-staining, 3–10 cm. high, the branchlets slender and more or less dichotomous, brownish beneath the light gray strigose pubescence. Leaves oblong-ob lanceolate, 3–7 mm. long, whitish-strigose or short-hirsute; spikes numerous, leafy-bracted throughout, densely flowered and unilateral, rarely over 1 cm. long; flowers distinctly biserrate; corolla inconspicuous, the limb 0.5–1 mm. broad; fruiting calyx-lobes about 2 mm. long, oblong-lanceolate, erect, short-hispid; nutlets 4, 1–1.3 mm. long, smooth or tuberculate, 1 nutlet sometimes a little longer and more persistent than the others; groove extending to the apex of the nutlet, scarcely broadened at base; gynobase subulate, nearly as long as the calyx-lobes and bearing the sessile stigma at the apex.

Dry sandy soils, Sonoran Zones; Inyo County, California, south through the Mojave and Colorado Deserts and cismontane southern California to northern Lower California, east to Nevada, southern Utah, Arizona and southwestern Texas. Type locality: "Sand hills, Frontera, Texas, and in other places along the Rio Grande." March–June.

Eremocarya micrantha var. *lepida* (A. Gray) J. F. Macbride, 51: 545. 1916. (*Eritrichium micranthum* var. *lepdatum* A. Gray, Syn. Fl. N. Amer. 2: 193. 1878; *Eremocarya lepida* Greene, Pittonia 1: 59. 1887; *Cryptantha micrantha* var. *lepida* I. M. Johnston, Contr. Gray Herb. No. 68: 57. 1923; *Eremocarya Abramsiana* Brand, Pflanzenreich 4²²: 77. 1931.) Plants a little more robust, commonly 8–15 cm. high; corolla 1.5–3.5 mm. broad. Mountain valleys, Arid Transition Zone; Mount Pinos, Ventura County, south through the mountains of southern California to northern Lower California. Type locality: "San Diego Co., D. Cleveland," but probably from the Laguna or Cuyamaca Mountains east of San Diego.

21. *CRYPTÁNTHA* Lehm. ex Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 35.

1836.

Mostly low, erect, branching, setose or hispid annual herbs with narrow alternate entire leaves and small white flowers in scorpioid bractless or bracteate spikes. Calyx 5-parted or 5-cleft, erect or spreading in fruit, at length deciduous. Corolla small, funnel-form, usually with 5 scales closing the throat. Stamens included; filaments short. Ovary 4-divided; style short; stigma capitate. Nutlets erect, rounded more or less on the back, obtuse, acute or winged on the margins, attached laterally to the conical or elongated receptacle; scar elongated. [Name Greek, meaning hidden flower; the original species had cleistogamous flowers.]

A New World genus of about 60 species, mainly western North America, but some also in western and southern South America. Type species, *Cryptantha glomerata* Lehm.

Surface of nutlets papillate, tuberculate or muricate, or sometimes when heteromorphous the odd nutlet smooth.

Lateral angles of nutlets sharply angled or knife-like or prominently winged.

Nutlets 4, triangular-ovate or triangular-oblong, homomorphic or heteromorphic; odd nutlet abaxial.

I. *Angustifoliae*.

Nutlets 1–4, lanceolate; lateral angles knife-like or distinctly winged; odd nutlet axial.

II. *Pterocaryae*.

Lateral angles of nutlets rounded or obtuse, not winged.

Nutlets heteromorphic, 1–4, the large nutlet axial and sometimes less roughened.

III. *Maritimae*.

Nutlets homomorphic, all alike or nearly so, normally 4, sometimes fewer by abortion even on the same plant.

Nutlets lanceolate to ovate-lanceolate, convex on the dorsal side.

IV. *Barbigerac*.

Nutlets ovate or triangular-ovate.

Dorsal side of nutlets obtuse and with at least a faint median ridge.

V. *Muricatae*.

Dorsal side of nutlets flat or low-convex, without median ridge.

VI. *Ambiguae*.

Surface of nutlets smooth and shining, their lateral angles rounded or obtuse.

Groove of nutlets median.

Hairs of calyx straight or soft and somewhat wavy, not encrusted or hooked; nutlets 1–4.

Dorsal side of nutlets low-convex or flat; nutlets 1–4, homomorphic.

Nutlets ovate to lanceolate, their lateral angles obtuse or rounded.

VI. *Ambiguae*.

Nutlets oblong-ovate to lanceolate, sharply angled on the sides especially toward the apex.

VII. *Mohavenses*.

Dorsal side of nutlets rounded-convex, lateral angles rounded or obtuse.

Nutlets lanceolate, nearly homomorphic, the axial one always present and slightly larger than the others.

Nutlets 1 or rarely 2.

VIII. *Graciles*.

Nutlets 4.

IX. *Ramulosissimae*.

Nutlets ovate or ovate-lanceolate, the abaxial one always present.

X. *Lciocarpae*.

Hairs of calyx-lobes arcuate or uncinat, and with a pallid incrustation; nutlet 1.

XI. *Flaccidae*.

Groove of nutlet eccentric, one side of nutlet on lower surface appearing as if somewhat deformed.

XII. *Affines*.I. *ANGUSTIFOLIAE*.

Lateral angles of nutlets distinctly winged; pedicels slender, 1–4 mm. long.

Nutlets broadly winged, homomorphic.

1. *C. holoptera*.

Nutlets narrowly winged, heteromorphic; plants flowering as an annual, but often persisting several years and suffruticose.

2. *C. racemosa*.

- Lateral angles of nutlets knife-like or merely sharply acute; pedicels stout, very short, less than 1 mm. long.
 Margins of lateral angles knife-like.
 Nutlets heteromorphic. 3. *C. inaequata*.
 Nutlets homomorphic. 4. *C. costata*.
 Margins of lateral angles merely sharply angled. 5. *C. angustifolia*.

II. PTEROCARYAE.

- Mature nutlets 1 or rarely 2, usually with knife-like lateral angles. 6. *C. utahensis*.
 Mature nutlets 4, usually distinctly winged.
 Corolla conspicuous, 4-7 mm. broad; nutlets homomorphic, narrowly winged. 7. *C. oxygona*.
 Corolla inconspicuous, about 1 mm. broad; nutlets heteromorphic; odd one often wingless, the others rather broadly winged. 8. *C. pterocarya*.

III. MARITIMAE.

- Fruiting calyx conspicuously recurved or deflexed, the axial lobe longest and most conspicuously hirsute; nutlets bent. 9. *C. recurvata*.
 Fruiting calyx spreading or erect, the abaxial lobe most conspicuously hirsute; nutlets straight.
 Calyx ascending or spreading, not gibbose at base.
 Nutlets triangular-ovate; calyx minute, subglobose, the lobes barely surpassing the nutlets. 10. *C. micromeres*.
 Nutlets oblong-lanceolate; calyx oblong, the lobes distinctly surpassing the nutlets. 11. *C. maritima*.
 Calyx strictly erect and closely appressed to the rachis, gibbose on the axial side at base. 12. *C. dumetorum*.

IV. BARBIGERAE.

- Nutlets 1 or rarely 2; style short, half as long as nutlet or less.
 Corolla inconspicuous, less than 1 mm. broad. 13. *C. decipiens*.
 Corolla conspicuous, 2-3.5 mm. broad. 14. *C. corollata*.
 Nutlets normally 4; style two-thirds as long to longer than the nutlets.
 Plants hirsute with spreading hairs.
 Corolla conspicuous, commonly 5 mm. broad but varying from 2-8 mm. in width. 15. *C. intermedia*.
 Corolla inconspicuous, 1-2 mm. broad. 16. *C. barbiger*.
 Plants strigose; corolla inconspicuous, 1-2 mm. broad.
 Nutlets verrucose or verrucose-muricate. 17. *C. nevadensis*.
 Nutlets spinular-muricate. 18. *C. scoparia*.

V. MURICATAE.

- A single species. 19. *C. muricata*.

VI. AMBIGUAE.

- Dorsal surface of nutlets more or less roughened.
 Nutlets usually solitary, more or less roughened.
 Nutlets horizontal, bent; pedicels stout, less than 1 mm. long; calyx distinctly bristly on the midrib. 20. *C. excavata*.
 Nutlets erect, straight; calyx-lobes not bristly on the midrib.
 Pedicels slender, 2-3 mm. long; calyx-lobes villous with long white hairs. 21. *C. crinita*.
 Pedicels stout, usually less than 1 mm. long; hairs on calyx-lobes straight and ascending, those on the midribs a little longer but not bristly. 22. *C. Milobakeri*.
 Nutlets 4, erect; pedicels stout, about 1 mm. or less in length.
 Corolla conspicuous, the limb 4-7 mm. broad. 23. *C. Hendersonii*.
 Corolla inconspicuous, the limb 0.5-2 mm. broad.
 Flowers in definite spikes.
 Nutlets 2-2.5 mm. long; spikes naked or bracted only at base.
 Stems closely strigose; spikes generally geminate or ternate; calyx-lobes armed on midrib with reflexed or arcuate bristles; nutlets broadly ovate, tessellate-papillate. 24. *C. simulans*.
 Stems spreading-hirsute; spikes generally solitary; calyx-lobes armed on midrib with straight spreading tawny bristles; nutlets low-convex on the back.
 Nutlets grayish, conspicuously echinate on the back. 25. *C. echinella*.
 Nutlets with low rounded tubercles on the back or nearly smooth toward the base. 26. *C. ambigua*.
 Nutlets minute, 1.5 mm. long; spikes bracted throughout. 27. *C. Traskiae*.
 Flowers solitary or in glomerules in the axils of the leaves, forming a thyrsus or panicle. 28. *C. Hooveri*.
 Dorsal surface of nutlets smooth, but sometimes faintly tessellate.
 Corolla inconspicuous, limb about 1 mm. wide. 29. *C. Torreynana*.
 Corolla conspicuous, limb 3-6 mm. wide.
 Plants slender, not stiff, stems slender, erect with slender ascending branches; racemes geminate, bractless; fruiting calyx about 2 mm. long.
 Corolla-limb 3-4 mm. broad; calyx with the abaxial lobe bearing 1 or more elongated spreading bristles; nutlets grayish-mottled with brown. 30. *C. incana*.
 Corolla-limb 5-6 mm. broad; calyx rather uniformly hispid, the abaxial lobe without elongated spreading bristles; nutlets dark colored, not mottled. 31. *C. grandiflora*.
 Plants stiff, low and widely branched; spikes mostly solitary, sometimes bracteate below; calyx 5-7 mm. long. 32. *C. mariposae*.

VII. MOHAVENSES.

- Corolla conspicuous, limb 4-7 mm. wide; style distinctly surpassing the nutlets. 33. *C. mohavensis*.
 Corolla inconspicuous, limb about 1 mm. wide; style included or about equaling the nutlets. 34. *C. Watsonii*.

VIII. GRACILES.

- A single species. 35. *C. gracilis*.

IX. RAMULOSISSIMAE.

- A single species. 36. *C. Fendleri*.

X. LEOCARPAE.

Hairs on upper part of calyx-lobes spreading or ascending.

Styles about two-thirds to nearly as high as nutlets.

- Spikes bracteate, dense, mostly 8-15 mm. long; nutlets usually 4, rarely reduced to 1 by abortion. 37. *C. leiocarpa*.

Spikes naked, or the lowest flowers sometimes bracteate.

Nutlets 1-4, low-rounded on the back, flattened on the ventral side, not circular in cross section.

- Fruiting calyx 2-4 mm. long, moderately white-bristly. 38. *C. Clevelandii*.

- Fruiting calyx 6-10 mm. long, conspicuously tawny-bristly; spikes stiffly erect, 5-15 cm. long. 39. *C. Ganderi*.

Nutlets 1, lanceolate, rounded on both sides and circular in cross section.

40. *C. hispidula*.

Styles less than half the length of nutlets; fruiting calyx 1.5-2 mm. long; nutlet 1, lanceolate-attenuate or rostellate. 41. *C. microstachys*.

Hairs on the upper part of calyx-lobes decidedly reflexed.

42. *C. nemaclada*.

XI. FLACCIDAE.

- Nutlets with an open areole at base of groove; style about two-thirds the height of nutlets; plants often coarse. 43. *C. rostellata*.

Nutlets with closed groove; styles less than one-half as high as nutlets; very slender plants.

- Nutlets rounded dorsally and on the margins, only slightly compressed, ovate-lanceolate and rostrate-acuminate. 44. *C. flaccida*.

Nutlets flattened on both surfaces and angled on the margins, ovate, acute or short-acuminate.

45. *C. sparsiflora*.

XII. AFFINES.

- Nutlets 4; style at least two-thirds the height of nutlets; plants erect; flowers in spikes 2-8 cm. long.

46. *C. affinis*.

- Nutlets 1; style less than one-half the height of nutlets; plants spreading; flowers in axillary glomerules.

47. *C. glomeriflora*.

1. *Cryptantha holóptera* (A. Gray) J. F. Macbride. Winged *Cryptantha*. Fig. 4265.

Eritrichium holopteron A. Gray, Proc. Amer. Acad. 12: 81. 1876.

Krynitzkia holoptera A. Gray, op. cit. 20: 276. 1885.

Cryptantha holoptera J. F. Macbride, Contr. Gray Herb. No. 48: 48. 1916.

Stems erect, 1-6 dm. high, branches usually many along the main stem, ascending, spreading-hispid and strigose. Leaves linear-lanceolate, the upper sessile, the lower petioled, 2.5-6 cm. long, 2-8 or rarely 10 mm. wide, acute or obtuse, conspicuously pustulate and hispid below, somewhat less so above; racemes geminate, naked or with a few bracts below, mostly 4-5 cm. long, sometimes longer; corolla 2 mm. broad, the lobes ascending; fruiting calyx oblong-ovoid, 2.5-3.5 mm. long, the lobes lanceolate, somewhat connivent, hispid on the thickened midrib, strigose on the margins; nutlets 4, similar, 1.5-2.5 mm. long, oblong-ovoid or triangular-ovate, the dorsal side dark with pale tubercles, margins narrowly to broadly winged, groove open or closed above, dilated into an areole at base; style distinctly surpassing the nutlets but shorter than the calyx-lobes.

Gravelly or rocky slopes and ridges, Lower Sonoran Zone; Inyo County south to southern border of Imperial County, California, east to Mohave and Yuma Counties, Arizona. Type locality: Ehrenberg, Arizona. Feb.-April.

2. *Cryptantha racemosa* (S. Wats.) Greene. Bushy *Cryptantha*. Fig. 4266.

Eritrichium racemosum S. Wats. in A. Gray, Proc. Amer. Acad. 17: 226. 1882.

Krynitzkia ramosissima A. Gray, op. cit. 20: 277. 1885.

Cryptantha suffruticosa Piper, Proc. Biol. Soc. Wash. 32: 42. 1919.

Cryptantha racemosa var. *lignosa* I. M. Johnston, Univ. Calif. Pub. Bot. 7: 445. 1922.

Johnstonella racemosa Brand, Rep. Spec. Nov. 21: 249. 1925.

Flowering as an annual but commonly persisting several years and the stem becoming distinctly woody below, mostly bushy-branched, forming clumps 3-7 dm. high, ultimate branchlets very slender, strigose, epidermis at length exfoliating, leaving the older woody stems glabrous and brown. Leaves linear-subulate to narrowly oblanceolate, 0.5-4 cm. long; racemes slender, loosely flowered, terminating the spreading or ascending paniculately disposed branchlets, 2-4 cm. long, minutely bracteate; pedicels slender, often recurved; fruiting calyx 2 mm. high; lobes narrowly linear-lanceolate, slightly keeled on the back, armed with stiff spreading bristles and strigose; corolla slightly exserted, limb about 1 mm. broad; nutlets 4, triangular-ovoid, acute at apex and slightly curved outward, groove open or closed above broadening below into a triangular areola, heteromorphous, the odd nutlet 1-2 mm. long, finely muricate or tuberculate, light

or dark with pale tubercles; gynobase subulate, about equaling the 3 consimilar nutlets; style much surpassing the nutlets.

Sandy flats or rocky ridges, Lower Sonoran Zone; Inyo County, California, south to northeastern Lower California and east to southern Nevada and Mohave and Yuma Counties, Arizona. Type locality: Mesquite Station, Imperial County, California. March-June.

3. *Cryptantha inaequata* I. M. Johnston. Panamint *Cryptantha*. Fig. 4267.

Cryptantha inaequata I. M. Johnston, Univ. Calif. Pub. Bot. 7: 444. 1922.

Johnstonella inaequata Brand, Rep. Spec. Nov. 21: 250. 1925.

Stems erect or ascending, 3-4 dm. high, branched throughout or sometimes the basal branches elongated and simple or nearly so, strigose and bristly with slender spreading hairs. Leaves linear or the lower narrowly oblanceolate, 1.5-4 cm. long, 1-4 mm. wide, hispid or strigose, pustulate, especially underneath; spikes mostly geminate, 4-8 cm. long, loosely or rather densely flowered, bractless or rarely with 1 or 2 small bracts; corolla minute, tube 1-2 mm. long, limb 1.5-2.5 mm. broad; fruiting calyx stiffly ascending, ovoid-oblong, 3-4 cm. long, distinctly biseriate, sessile or nearly so; calyx-lobes rigid, slightly connivent, hispid on the thickened midrib, villous-ciliate on the margins; nutlets 4, heteromorphous, brown with pale tubercles, about 1 mm. long, odd one similar in color but a little longer and more persistent; gynobase columnar, equaling the 3 consimilar nutlets; style a little exceeding or equaling the odd nutlet.

Desert slopes, Sonoran Zones; eastern Mojave Desert, Inyo and San Bernardino Counties, California. Type locality: Pleasant Canyon, Panamint Mountains, Inyo County, California. March-May.

Cryptantha saxorum Jepson, Fl. Calif. 3: 345. 1943. Stem widely branching from the base, 5-7 cm. high, spreading-hispid. Leaves lanceolate, 8-24 mm. long, the hairs on the upper surface pustulate at base; spikes dense, 1-2 cm. long, conspicuously bracteate; calyx short-bristly, densely tufted with white hairs at base; corolla-limb 1 mm. wide; nutlets 4, equal, ovoid, light brown, thinly papillate both sides, the ventral side convexly 2-planed, ventral groove closed with forked areole at base. Known only from the type collection: "lava hill 1 mile sw. of Bicycle Lake, near Tiefort Mt., Mohave Desert."

4. *Cryptantha costata* Brandg. Ribbed *Cryptantha*. Fig. 4268.

Cryptantha costata Brandg. Bot. Gaz. 27: 453. 1899.

Cryptantha seorsa J. F. Macbride, Contr. Gray Herb. No. 48: 46. 1916.

Annual, stems stout, branched throughout, 1-2 dm. high, whitish-canescens with strigose-villous pubescence, and somewhat hispid, especially on the branches. Leaves linear to narrowly lanceolate, 1-3 cm. long, often becoming more or less convolute, villous-strigose above, short-hispid and pustulate beneath; racemes spike-like, rather rigid, 2-5 cm. long, sparsely bracteate, rather densely flowered; corolla about 2 mm. long, lobes broad and ascending; fruiting calyx 4-6 mm. long, oblong-ovoid, its lobes linear-lanceolate, somewhat connivent above the nutlets but the tips slightly spreading, hispid on the thickened midrib; nutlets 4, similar or 1 slightly larger than the others, barely 2 mm. long, narrowly triangular, strongly convex on the back, inconspicuously rugulose or verrucose, the margins sharp or narrowly winged; groove dilated below into a deltoid shallow areola; gynobase subulate, equaling the nutlets; style much surpassing the nutlets.

Sandy washes and benches, Lower Sonoran Zone; Inyo County to San Diego County, California, eastward to adjacent Arizona. Type locality; Borrego Springs, San Diego County, California. Feb.-May.

5. *Cryptantha angustifolia* (Torr.) Greene. Narrow-leaved *Cryptantha*. Fig. 4269.

Eritrichium angustifolium Torr. Pacif. R. Rep. 5: 363. 1858.

Krynitzkia angustifolia A. Gray, Proc. Amer. Acad. 20: 272. 1885.

Cryptantha angustifolia Greene, Pittonia 1: 112. 1887.

Stems diffusely branched from the base, 0.5-3 cm. high, villous-hispid with spreading or ascending, light ashy gray hairs, the lowest branches decumbent or ascending. Leaves narrowly linear, 1.5-4 cm. long, 1-2 or rarely 4 mm. wide, hispid and pustulate; spikes usually geminate, about 3-5 cm. long, bractless or with 1 or 2 bracts near the base; corolla minute, limb 1-2.5 mm. broad; fruiting calyx 3-4 mm. long, stiffly ascending and conspicuously biseriate, subsessile; lobes linear-lanceolate, slightly connivent, hispid on the thickened midrib, short-villous on the margins, lower lobe longest and more conspicuously hispid; nutlets 4, about 1 mm. long, heteromorphous, groove slightly open above broadening at base; gynobase columnar, equaling the 3 similar nutlets but shorter than the odd more persistent one; style usually surpassing the odd nutlet.

Sandy or gravelly washes, Lower Sonoran Zone; Death Valley region, Inyo County, California, south through the Mojave and Colorado Deserts to northeastern Lower California, east to western Texas and Sonora. Type locality: Yuma, Arizona. March-June.

6. *Cryptantha utahensis* (A. Gray) Greene. Scented *Cryptantha*. Fig. 4270.

Eritrichium holopterum var. *submolle* A. Gray, Proc. Amer. Acad. 13: 374. 1878.

Krynitzkia utahensis A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 427. 1886.

Cryptantha utahensis Greene, Pittonia 1: 120. 1887.

Cryptantha submollis Coville, Contr. U.S. Nat. Herb. 4: 166. 1893.

Usually with a main erect stem with a few scattered ascending or erect branches, 1-3 dm. high, strigose or appressed short-hispid. Leaves elongated below, mostly linear, 3-5 cm. long,

the upper smaller and spreading, appressed short-hispid and pustulate especially beneath; spikes usually geminate, commonly 1–2 cm. long, dense, bractless; corolla rather conspicuous, 2–3 mm. broad; fruiting calyx ovoid to oblong-ovoid, 2–3 mm. long, sessile, spreading or slightly recurved, densely villous-hispid below with slender, ascending, whitish hairs; mature calyx-lobes connivent, rather sparsely hispid; only 1 or rarely 2 nutlets maturing, broadly lanceolate, granulate or muricate-papillate, nearly flat on the back, sharply angled on the sides; style usually barely equaling the nutlets.

Sandy or rocky places, desert washes and hillsides, Lower Sonoran Zone; deserts of southern California, in Inyo, San Bernardino, and Riverside Counties, east through southern Nevada to southern Utah, and Mohave County, Arizona. Type locality: St. George, Utah. March–May.

7. *Cryptantha oxýgona* (A. Gray) Greene. Sharp-nut *Cryptantha*. Fig. 4271.

Eritrichium oxgonum A. Gray, Proc. Amer. Acad. 19: 89. 1883.

Krynitzkia oxgona A. Gray, op. cit. 20: 277. 1885.

Cryptantha oxgona Greene, Pittonia 1: 120. 1887.

Stems usually with several ascending branches from or near the base, 1–4 dm. high, strigose with very slender pointed hairs. Leaves linear to linear-lanceolate, 1–4 cm. long, pubescent on both sides, as on stem but the hairs appressed and more distinctly pustulate; spikes in pairs or more often in threes, 1–3 cm. long, usually densely flowered, bractless; corolla-limb 4–7 mm. broad; fruiting calyx ovoid or oblong-ovoid, ascending, 2.5–4 mm. long, symmetrical; mature calyx-lobes slightly connivent, silky-strigose on the margin, midrib thicker and usually sparsely hispid; nutlets 4, similar, oblong-ovoid, 2–2.5 mm. long, muriculate or tuberculate, narrowly winged on the margin; groove broadly forked below, often forming a triangular areola; style distinctly surpassing the nutlets.

Dry slopes, Upper Sonoran Zone; Inner Coast Ranges bordering the San Joaquin Valley in Fresno and Merced Counties; east side of the Sierra Nevada from Madera County south to the desert slopes of the Santa Rosa Mountains, Riverside County, California. Type locality: "on hills bordering the Mohave Desert." April–May.

8. *Cryptantha pterocàrya* (Torr.) Greene. Wing-nut *Cryptantha*. Fig. 4272.

Eritrichium pterocaryum Torr. Bot. Mex. Bound. 142. 1859.

Eritrichium pterocaryum var. *pectinatum* A. Gray, Proc. Amer. Acad. 10: 61. 1874.

Krynitzkia pterocaryum var. *pectinata* A. Gray, op. cit. 20: 276. 1885.

Cryptantha pterocarya Greene, Pittonia 1: 120. 1887.

Stems erect, branched throughout with ascending branches, 1–5 dm. high, short-hirsute with either appressed or ascending slender pointed hairs. Leaves linear or the reduced uppermost ones lanceolate or oblong, strigose or the hairs ascending, conspicuously pustulate on the lower surface, less so on the upper; spikes usually in pairs, bractless or rarely with 1 or 2 bracts below, 2–6 or rarely 10 cm. long, usually becoming loosely flowered in age; corolla inconspicuous, 0.5–1 mm. or rarely 2 mm. broad; fruiting calyx distinctly accrescent, 3–5 mm. long, symmetrical, ascending on short pedicels; mature calyx-lobes ovate to ovate-lanceolate, somewhat connivent, thin, margins more or less tawny, hirsutulous, midrib slightly thickened and sparsely hispid; nutlets 4, heteromorphous, the body oblong-lanceolate to lanceolate, 2–2.5 or rarely 3 mm. long, muricate or verrucose, axial one not margined, the other three with usually broad wings, these either entire, crenate or lobed; style surpassing the body of nutlets.

Sandy or gravelly places, Upper and Lower Sonoran Zones; east of the Cascades and the Sierra Nevada from southern Washington to the deserts of California and northern Lower California; east to southern Idaho, Utah, Arizona, and northern Sonora. Type locality: Walla Walla, Washington, as designated by I. M. Johnston, Contr. Gray Herb. No. 74: 53. 1925. April–June.

Cryptantha pterocarya var. *Purpusii* Jepson, Man. Fl. Pl. Calif. 849. 1925. Inflorescence denser; calyx smaller; nutlets heteromorphous, one not margined, the other with the wing-margin narrower than in the typical species, and knife-like. Southern California deserts; Argus Mountains, Darwin, and San Bernardino Mountains. Type locality: Argus Mountains, Inyo County, California.

Cryptantha pterocarya var. *cycloptera* (Greene) J. F. Macbride, Contr. Gray Herb. No. 48: 44. 1916. (*Krynitzkia cycloptera* Greene, Bull. Calif. Acad. 1: 207. 1884.) Nutlets all wing-margined, otherwise like the typical material. Deserts of southern California east to southern Utah, Arizona, New Mexico, and southwestern Texas. Type locality: near Tucson, Arizona.

9. *Cryptantha recurvâta* Coville. Curved-nut *Cryptantha*. Fig. 4273.

Cryptantha recurvata Coville, Contr. U.S. Nat. Herb. 4: 165. pl. 16. 1893.

Stems branched from the base, slender, ascending or decumbent at base, 1–3 dm. high, strigose, root often dye-staining. Basal leaves oblanceolate or spatulate, 1.5–2 cm. long, those of the stem remote, linear or lanceolate, 5–10 mm. long, rounded or obtuse, rather finely appressed-hispid and minutely pustulate; spikes bractless, solitary or geminate, slender, loose in age, 2–10 cm. long; corolla scarcely exerted, about 2 mm. long, limb 1.5 mm. broad; fruiting calyx slender, distinctly asymmetrical, bent and recurved, 3 mm. long; mature calyx-lobes very narrowly linear, midrib thickened and hispid; ovary 2-parted; mature perfect nutlet oblong-lanceolate, curved inwardly, dull brownish, granulate-papillate, rounded on the angles; gynobase about one-half as long as perfect nutlet, and about as long as the abortive one.

Sandy or gravelly places, Sonoran Zones; Alvord Desert, southeastern Oregon, White and Panamint Mountains, California, east to Nevada and Utah. Type locality: Surprise Canyon, Panamint Mountains, California. April–June.

10. *Cryptantha micrómeres* (A. Gray) Greene. Minute-flowered *Cryptantha*. Fig. 4274.

Eritrichium micromeres A. Gray, Proc. Amer. Acad. 19: 90. 1883.

Krynitzkia micromeres A. Gray, op. cit. 20: 274. 1885.

Cryptantha micromeres Greene, Pittonia 1: 113. 1887.

Stems simple below and erect, or branched from the base and branches ascending, 1–3 dm. high, divaricately short-hispid throughout. Leaves linear or oblong-linear, 1–4 cm. long, short-hispid on both sides with ascending hairs, the upper side rather inconspicuously pustulate; spikes 1–3, very slender, bractless, 2–8 cm. long; corolla minute, nearly tubular, about 0.5 mm. broad; fruiting calyx barely over 1 mm. long, subglobose, early deciduous; mature calyx-lobes ovate, strongly connivent, slenderly hispid, the bristles in the midribs often minutely uncinat; nutlets 4, triangular-ovoid, 0.7–1 mm. long, papillate on the odd slightly larger one, sometimes smooth; style equaling or slightly surpassing the odd nutlet.

Grassy hillsides, Upper Sonoran Zone; Marin and Amador Counties, California, to northwestern Lower California, also on Santa Cruz and Santa Catalina Islands. Type locality: Santa Cruz, California. April–July.

11. *Cryptantha marítima* Greene. Guadalupe *Cryptantha*. Fig. 4275.

Krynitzkia maritima Greene, Bull. Calif. Acad. 1: 204. 1885.

Krynitzkia ramosissima Greene, op. cit. 203. August 1885; not A. Gray, January 1885.

Cryptantha maritima Greene, Pittonia 1: 117. 1887.

Stems loosely branched, 1–3.5 dm. high, rather sparsely strigose or sparsely hispid, brown or reddish. Leaves narrowly linear to linear-lanceolate, acutish, hispid and conspicuously pustulate; spikelets 1–6 cm. long, usually more or less crowded or glomerate at the ends of the lateral branchlets, usually leafy-bracted throughout; corolla minute, tubular, 1.5–2 mm. long, 0.5–1 mm. broad; fruiting calyx asymmetrical, 2–3.5 mm. long; mature calyx-lobes linear-lanceolate, connivent, firm, three of the lobes hispid on the midrib and more or less villous, especially on the margins; ovules 2; nutlets 1–2, heteromorphous, the odd nutlet frequently the only one maturing, smooth, shining, and brownish, oblong-lanceolate, 1–2 mm. long, persistent; consimilar nutlets, when present, grayish and muriculate, readily deciduous; style about equaling consimilar nutlets.

Dry washes and desert slopes, Sonoran Zones; Inyo County, California, south to Lower California, and east to Nevada, Arizona, and Sonora. Type locality: Guadalupe Island, Lower California. April–May.

Cryptantha maritima var. *pilósa* I. M. Johnston, Univ. Calif. Pub. Bot. 7: 445. 1922. Calyx-lobes densely white-villous. Same general range as the species. Type locality: Los Angeles Bay, Lower California.

12. *Cryptantha dumetòrum* Greene. Bush-loving *Cryptantha*. Fig. 4276.

Krynitzkia dumetorum Greene ex A. Gray, Proc. Amer. Acad. 20: 272. 1885.

Cryptantha dumetorum Greene, Pittonia 1: 112. 1887.

Cryptantha intermedia var. *dumetorum* Jepson, Man. Fl. Pl. Calif. 849. 1925.

Stems becoming diffusely branched and at length sprawling or scrambling among low bushes, very brittle, sparsely strigose. Leaves lanceolate, 2–4 cm. long, sparsely hispid, and conspicuously pustulate; spikes solitary or geminate, 5–10 cm. long, usually loosely flowered, naked or sometimes with foliaceous bracts toward the base; corolla minute, limb about 1 mm. broad; calyx closely appressed to rachis, 2–3 mm. long, asymmetrical, base very oblique; mature calyx-lobes connivent, the 3 outer deflexed-hispid on the thickened midrib; nutlets 4, granulate and muriculate, heteromorphous, the odd one with base enlarged and distorting the calyx, 2–3 mm. long, with a broad open groove, the 3 consimilar ones a little shorter, lanceolate and the groove closed or very narrow; style shorter or equaling the nutlets.

Sandy valleys or hillsides, Sonoran Zones; western and central Mojave Desert, California, east to southwestern Nevada. Type locality: Tehachapi Pass, Kern County. April–May.

13. *Cryptantha decípiens* (M. E. Jones) Heller. Gravel *Cryptantha*. Fig. 4277.

Krynitzkia decipiens M. E. Jones, Contr. West. Bot. No. 13: 6. 1910.

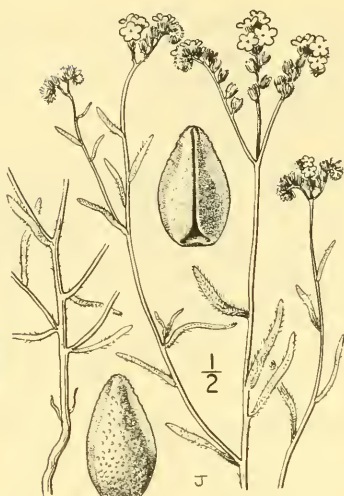
Cryptantha decipiens Heller, Muhlenbergia 8: 48. 1912.

Stems 1–4 dm. high, slender, loosely branched, strigose and sometimes short-hispid. Leaves few, linear, obtuse, 1–3 cm. long, strigose or short-hispid, pustulate; spikes slender, geminate or rarely solitary or ternate, bractless, usually becoming loosely flowered, 4–10 cm. long; corolla inconspicuous, less than 1 mm. broad; fruiting calyx ovoid to ovoid-oblong, strictly ascending, 3–4 mm. long; mature calyx-lobes narrowly linear, connivent, with the tips usually spreading, midrib thickened, usually conspicuously hirsute-hispid, margins strigose, the abaxial lobe longer and more densely hirsute; nutlets 1 or rarely 2, next abaxial calyx-lobe, ovoid-lanceolate, muriculate-granulate to tuberculate, usually brownish, convex on the back, rounded on the sides, groove open or closed, dilated below into a definite areola; gynobase short, half to a third as high as nutlet; style very short, well surpassed by nutlet.

Sandy or gravelly slopes, Lower Sonoran Zone; Mojave Desert, Kern and Inyo Counties, south through the deserts to the southern boundary of the state, east to southwestern Nevada and western Arizona. Type locality: Yucca, Arizona. March–May.



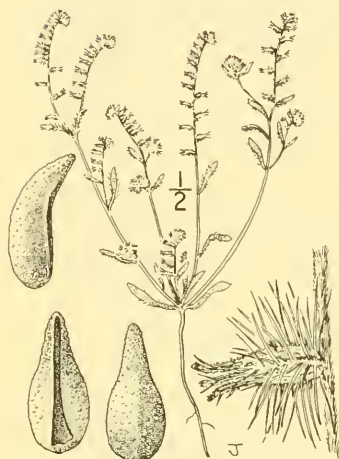
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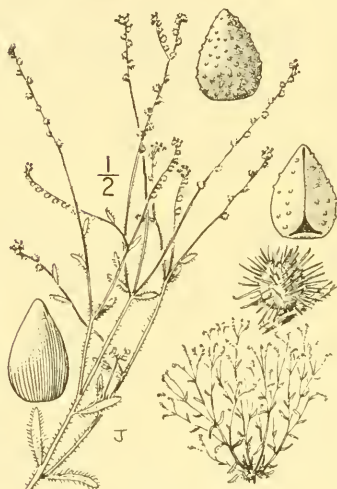
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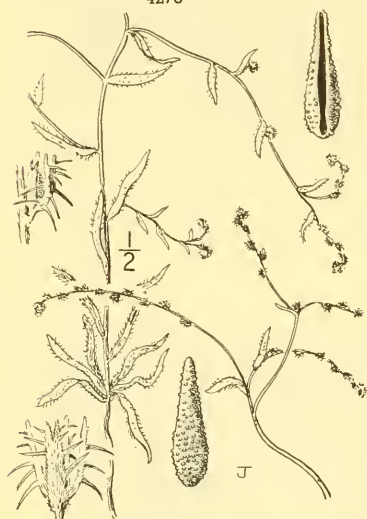
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4270. *Cryptantha utahensis*
 4271. *Cryptantha oxygona*
 4272. *Cryptantha pterocarya*

4273. *Cryptantha recurvata*
 4274. *Cryptantha micromeres*
 4275. *Cryptantha maritima*

4276. *Cryptantha dumetorum*
 4277. *Cryptantha decipiens*
 4278. *Cryptantha corollata*

14. *Cryptantha corollata* I. M. Johnston. Coast Range *Cryptantha*. Fig. 4278.*Cryptantha decipiens* var. *corollata* I. M. Johnston, Contr. Gray Herb. No. 74: 61. 1925.*Cryptantha corollata* I. M. Johnston, Journ. Arnold Arb. 18: 24. 1937.

Stems slender, erect, 2-3 dm. high, with few ascending branches from the middle or above, or sometimes more abundantly branched throughout, appressed-hispidulous throughout, sometimes also hirsute-hispid with spreading hairs, especially toward the base. Leaves mostly narrowly linear, acute, strigose, bristly hispid on the margins and midvein; spikes naked, geminate or ternate, 4-12 cm. long; corolla 2-3.5 mm. broad; fruiting calyx ascending, about 3 mm. long, white-strigose, the outer lobes also bristly with spreading often slightly subulate bristles; nutlet 1, ovoid-lanceolate, acuminate, 2 mm. long, brownish, granulate and papillate-muriculate on both sides, low-convex on the back but with a low broadish ridge toward the base; groove closed throughout and raised into a narrow keel, dilated at base into a small areola.

Canyons and hillsides, Upper Sonoran Zone; California Coast Ranges from San Benito and Monterey Counties to Riverside County. Type locality: "towards foothills, Ojai Valley," Ventura County. March-June.

Cryptantha corollata subsp. *Rattánii* (Greene) Abrams. (*Cryptantha Rattánii* Greene, Pittonia 1: 160. 1888.) Habit of the typical species, but stems hirsute-hispid with spreading hairs as well as strigose; corolla usually larger, 3-5 mm.; nutlets usually 2 or 3 maturing. Open slopes and flats, Upper Sonoran Zone; watershed of the Salinas and Carmel Rivers, Monterey County, California. Type locality: "Monterey County," Johnston (Journ. Arnold Arb. 20: 390. 1939.) designated the Hickman specimens in Greene's herbarium the type. Dr. Greene definitely stated that he described the taxonomically important fruit character from Hickman's plant, and that Rattan's specimens from San Jose "were young and only beginning to flower."

15. *Cryptantha intermedia* (A. Gray) Greene. Common *Cryptantha*. Fig. 4279.*Eritrichium intermedium* A. Gray, Proc. Amer. Acad. 17: 225. 1882.*Krynitzkia intermedia* A. Gray, op. cit. 20: 273. 1885.*Cryptantha intermedia* var. *Johnstonii* J. F. Macbride, Contr. Gray Herb. No. 56: 59. 1918.*Cryptantha Hansenii* Brand, Rep. Spec. Nov. 24: 58. 1927.*Cryptantha Hansenii* var. *pulchella* Brand, loc. cit.

Stems diffusely branched from the base or more commonly stiffly erect and branching above, 1.5-5 dm. high, hispid with spreading or sometimes appressed hairs. Leaves lanceolate to linear, acute or obtuse, hispid or strigose; spikes geminate or ternate, bractless, 5-15 cm. long; corolla commonly varying from 2-8 mm. but commonly about 5 mm. broad; fruiting calyx 2-7 mm. long, ascending or strict; mature calyx-lobes linear-lanceolate, connivent above with spreading tips, short-villous or appressed-hirsute, midrib pungently hispid, especially on the abaxial lobe; nutlets usually 4, homomorphous, ovoid-lanceolate, about 2 mm. long, coarsely and densely tuberculate on both surfaces, grayish or somewhat brownish, margins slightly angled; groove closed or narrow, gradually dilated below into a small areola; styles about equaling to slightly surpassing the nutlets.

Dry sandy or gravelly flats on hillsides, Upper Sonoran Zone; western Siskiyou County, California, southward west of the Sierra Nevada to cismontane southern California and northern Lower California. Type locality: Los Angeles, California. March-July.

16. *Cryptantha barbiger* (A. Gray) Greene. Bearded *Cryptantha*. Fig. 4280.*Eritrichium barbigerum* A. Gray, Syn. Fl. N. Amer. 21: 194. 1878.*Krynitzkia barbiger* A. Gray, Proc. Amer. Acad. 20: 273. 1885.*Cryptantha barbiger* Greene, Pittonia 1: 114. 1887.

Stems erect, solitary or several from the base, branches strictly ascending or spreading, very bristly hispid, sparsely or not at all strigose except in the inflorescence. Leaves broadly oblong to linear, obtuse, more or less pilose and hirsute below on the midrib and margins with rather stiff spreading hairs, more or less pustulate; corolla inconspicuous, limb 1-2 mm. broad; fruiting calyx ascending, 5-10 mm. long, narrowly oblong-ovoid to oblong-lanceolate, spreading or recurved, white-villous, especially on the margins, the midrib with a few pustulate bristles; nutlets 1-4, lanceolate-ovoid, 1.5-2.5 mm. long, strongly verrucose, usually brownish, rounded on the back and obscurely angled or rounded on the margins; groove gradually broadening toward the base with a triangular areola; style equaling or slightly surpassing the nutlets.

Desert regions, Sonoran Zones; Inyo County south through the Mojave and Colorado Deserts, California, to northeastern Lower California, east through southern Nevada to southern Utah, Arizona, New Mexico and Sonora. Type locality: Utah (Parry, 171) as designated by I. M. Johnston, Contr. Gray Herb. No. 74: 66. 1925. Feb.-May.

Cryptantha barbiger var. *Fergusoniae* J. F. Macbride, Contr. Gray Herb. No. 56: 59. 1918. (*Cryptantha Fergusoniae* Brand, Rep. Spec. Nov. 24: 58. 1927.) Essentially like the typical species, except corolla larger, the limb 4-6 mm. broad. In the larger corolla this variety shows also close relationship with *Cryptantha intermedia*. Vicinity of Palm Springs, Riverside County, California.

17. *Cryptantha nevadensis* Nels. & Kenn. Nevada *Cryptantha*. Fig. 4281.*Cryptantha nevadensis* Nels. & Kenn. Proc. Biol. Soc. Wash. 19: 157. 1906.*Krynitzkia barbiger* var. *inops* Brandg. Zoe 5: 228. (September) 1906.*Cryptantha arenicola* Heller, Muhlenbergia 2: 242. (December) 1906.*Cryptantha leptophylla* Rydb. Bull. Torrey Club 36: 678. 1909.*Cryptantha barbiger* var. *inops* J. F. Macbride, Proc. Amer. Acad. 51: 548. 1916.

Stems slender, 1-5 dm. high, 1 to several, erect or usually flexuous, closely short-strigose, mostly laxly branched. Leaves linear to linear-oblongate, acute or obtuse, 1-6 mm. broad, appressed-short-hispid, more or less pustulate; spikes in pairs or threes, terminal, also scattered

along the stem on short slender axillary branchlets, sometimes bracted, congested, or especially the terminal, elongated; corolla inconspicuous, limb 1–2 mm. broad; fruiting calyx oblong-ovoid to lanceolate, 8–12 mm. long; mature calyx-lobes linear or linear-lanceolate, connivent above with the tips recurved, more or less villous on the margins, and hispid on the midrib; nutlets 4, lanceolate, long-acuminate, about 2.5 mm. long, verrucose, conspicuously muriculate toward the apex; groove open or closed, dilated below into a small areola; style almost or quite equaling the nutlets.

Deserts, Sonoran Zones; Inyo County, California, south to the Colorado Desert and northern Lower California, east to Nevada, Utah, and Arizona. Type locality: Reno, Washoe County, Nevada. April–May.

Cryptantha nevadensis var. *rigida* I. M. Johnston, Contr. Gray Herb. No. 74: 68. 1925. Stems slender, erect, more or less hirsute-hispid with spreading hairs; calyx 5–10 mm. long; nutlets oblong-ovoid, acute, verrucose, about 2 mm. long. Inner Coast Ranges, Stanislaus County, and eastern slopes of the Santa Lucia Mountains, Monterey County, south to southern San Joaquin Valley and the western end of the Mojave Desert, California; also western Arizona. Type locality: "hills bordering Mojave Desert."

18. *Cryptantha scoparia* A. Nels. Desert *Cryptantha*. Fig. 4282.

Cryptantha muriculata var. *montana* A. Nels. Erythra 7: 69. 1899.

Cryptantha scoparia A. Nels. Bot. Gaz. 54: 144. 1912.

Stems with several to many stiffly erect branches, 10–35 cm. high, closely short-strigose and frequently sparsely hispid. Leaves narrowly linear to linear-lanceolate, 2–4 cm. long, strictly ascending, hispidulous with ascending often pustulate hairs; spikes stiffly erect, solitary or geminate, bractless, 2–10 cm. long; corolla inconspicuous, about 1 mm. wide at the tips of the ascending lobes; fruiting calyx oblong-ovoid, 5–6 mm. long, strictly ascending; mature calyx-lobes linear-lanceolate, rather stiff, somewhat connivent above with the tips slightly spreading, midrib costate, armed with stout divaricate whitish bristles, margins ascending-hispidulous; nutlets 4, homomorphous, lanceolate, sometimes broadly so, barely 2 mm. long, brownish and shining, sharply muriculate especially toward the apex, rounded at base and on the margins, groove narrow, forked below into a subulate areola.

Dry sagebrush plains, usually in sandy soils, Upper Sonoran Zone; Yakima County, Washington, and Harney and Malheur Counties, Oregon; also Idaho and Wyoming. Type locality: sagebrush land, Minidoka, Wyoming. May–July.

19. *Cryptantha muricata* (Hook. & Arn.) Nels. & Macbr. Prickly *Cryptantha*. Fig. 4283.

Myosotis muricata Hook. & Arn. Bot. Beechey 369. 1838.

Eritrichium ? *muriculatum* A. DC. Prod. 10: 132. 1846.

Krynitzkia muriculata A. Gray, Proc. Amer. Acad. 20: 273. 1885.

Cryptantha muriculata Greene, Pittonia 1: 113. 1887.

Cryptantha horridula Greene, op. cit. 5: 55. 1902.

Cryptantha muricata Nels. & Macbr. Bot. Gaz. 61: 42. 1916.

Stems erect, usually stout and simple below, several-branched above, 1–8 dm. high, conspicuously hirsute-hispid with spreading hairs, also strigose, especially above. Leaves linear, 1.5–3 cm. long, cinereous short-hirsute; spikes terminating the main branches, in twos or threes or often in fours, 4–10 cm. long in fruit, those of the comparatively few lateral branchlets smaller, geminate or ternate; corolla 2–6 mm. broad; fruiting calyx ovoid, 2–4 cm. long, the lobes lanceolate, connivent, short-hirsute on the sides with ascending hairs, midrib tawny-hispid; nutlets 4, homomorphous, ovoid-triangular, 1.5–2.5 mm. long, dull or somewhat shiny, conspicuously grayish, muriculate or tuberculate on both sides, sometimes somewhat verrucose dorsally, lateral angles usually acute and prominent; ventral groove slightly open or usually closed, broadly forked at base.

Dry gravelly slopes or washes, Upper Sonoran Zone; California Coast Ranges from Contra Costa County to Los Angeles County. Type locality: California. Collected by Douglas. April–July.

Cryptantha muricata var. *denticulata* (Greene) I. M. Johnston, Contr. Gray Herb. No. 74: 71. 1925. (*Krynitzkia denticulata* Greene, Bull. Calif. Acad. 1: 205. 1885; *Cryptantha denticulata* Greene, Pittonia 1: 114. 1887; *C. vitrea* Eastw. Proc. Calif. Acad. III. 2: 292. 1902; *C. densiflora* Nels. & Kenn. Proc. Biol. Soc. Wash. 19: 156. 1906.) Stems with a few well-developed lateral branches as in the typical species, but usually more slender; spikes not numerous, mostly geminate or ternate; corolla inconspicuous, 1–2 mm. broad. Gravelly slopes and flats, Arid Transition Zone; central Sierra Nevada, California, and western Nevada, south to the San Gabriel and San Bernardino Mountains, California. Type locality: western Nevada.

Cryptantha muricata var. *jonesii* (A. Gray) I. M. Johnston, Plant World 22: 114. 1919. (*Krynitzkia Jonesii* A. Gray, Proc. Amer. Acad. 20: 274. 1885; *Cryptantha Jonesii* Greene, Pittonia 1: 113. 1887.) Stems usually stout, commonly solitary and erect or sometimes several and fastigiate, bearing to below the middle many short lateral floriferous branchlets; spikes numerous, those on the ascending lateral branchlets short, grouped along the stem to form an elongated panicle inflorescence. Dry ridges and plains, mostly Upper Sonoran Zone; Coast Ranges (Glenn County) and Sierra Nevada (Nevada County) south to San Diego County, California, and adjacent Lower California, east to Nevada and Arizona. Type locality: Santa Cruz, California.

20. *Cryptantha excavata* Brandg. Deep-scarred *Cryptantha*. Fig. 4284.

Cryptantha excavata Brandg. Bot. Gaz. 27: 452. 1899.

Cryptantha abortiva Greene ex C. F. Baker, West Amer. Pl. 2: 10. 1903. (Nomen nudum.)

Stem simple below, branching above the base, 15–25 cm. high, branches slender, hirsute with more or less appressed hairs. Leaves linear, the lower 1.5–2 cm. long, the lower especially with the hairs conspicuously pustulate; spikes in twos or more often in threes, becoming 3–10 cm. long and loosely flowered; corolla-limb well-exserted, 2–3 mm. broad; fruiting calyx 2–2.5 mm.

long, as broad as long, the lobes often slightly spreading at the tip, villous with ascending hairs and also hispid mostly below the middle with spreading subulate bristles; nutlet solitary, horizontal or nearly so, ovoid-acuminate, obcompressed, the surface finely muriculate-papillose and with scattered tubercles and a few rather obscure rugose ridges, keeled dorsally, ventral side keeled above, the groove below opening with a large triangular deeply excavated scar.

Mostly in gravelly or sandy soils, Upper Sonoran Zone; Inner North Coast Ranges, in eastern Lake County, and Colusa and Yolo Counties, California. Type locality: Sites, Colusa County. April–May.

21. *Cryptantha crinita* Greene. Silky *Cryptantha*. Fig. 4285.

Cryptantha crinita Greene, *Erythea* 3: 66. 1895.

Stems 15–30 cm. high, branching from near the base, the branches rather strict, strigose and also hirsute. Leaves linear or very narrowly oblanceolate, the lower 2–3 cm. long; spikes usually in pairs on very slender peduncles, dense and conspicuously white-villous when young, elongating to 4–6 cm. in age; pedicels 1–2 mm. long; corolla 3–4 mm. broad; fruiting calyx 5–6 mm. long, densely and conspicuously white-villous-hirsute, the lobes erect; nutlets solitary, ovoid, abruptly attenuate above, 2.5 mm. long, the dorsal side rounded on the back, microscopically papillate and with a few low obscure tubercles.

Gravelly or sandy places in creek bottoms, Upper Sonoran Zone; foothills at the head of the Sacramento Valley, Shasta County, California. Type locality: Cow Creek, Shasta County. April–May.

22. *Cryptantha Milobàkeri* I. M. Johnston. Milo Baker's *Cryptantha*. Fig. 4286.

Cryptantha Milobakeri I. M. Johnston, *Journ. Arnold Arb.* 21: 63. 1940.

Cryptantha Torreyana var. *scrutata* Jepson, *Fl. Calif.* 3: 351. 1943.

Stems erect, 2–4.5 dm. high, with rather strictly ascending branches, moderately pubescent with rather slender appressed hairs and also similar but a little longer spreading hairs. Leaves linear-oblong to linear-lanceolate, 1–3 cm. long, with appressed or ascending hairs; spikes geminate or rarely ternate, 5–15 cm. long, often with a flower in the axil of the geminate ones; fruiting calyx 3–5 mm. long, densely hirsute-pilose with straight ascending whitish hairs, the hairs a little longer on the little enlarged midribs but otherwise similar and not at all retrorse; corolla 2–4 mm. broad; ovules 4; nutlets 1, or rarely 2 or 4, lanceolate-ovoid, 2–2.5 mm. long, smooth or inconspicuously tessellate, low-convex on the back, rounded on the margins; groove closed down to the forked base; style extending to about three-fourths the height of the nutlet.

Gravelly or rocky slopes, Transition Zones; western Siskiyou Mountains, southern Oregon, south in the Coast Ranges to Humboldt and Lake Counties, California. Type locality: between Kelseyville and Lower Lake, Lake County, California. May–July.

23. *Cryptantha Hendersonii* (A. Nels.) Piper. Henderson's *Cryptantha*. Fig. 4287.

Allocarya Hendersonii A. Nels. *Erythea* 7: 69. 1899.

Cryptantha monosperma Greene, *Pittonia* 5: 53. 1902.

Cryptantha grisea Greene, loc. cit.

Cryptantha trifurca Eastw. *Bull. Torrey Club* 32: 203. 1905.

Cryptantha Hendersonii Piper ex J. C. Nels. *Torreya* 20: 44. 1920.

Cryptantha scabrella Piper, *Proc. Biol. Soc. Wash.* 37: 95. 1924.

Cryptantha fragilis M. E. Peck, *Torreya* 32: 152. 1932.

Stems erect with few ascending branches, 1.5–5 dm. high, hirsute. Leaves oblanceolate to linear, acute or obtuse, appressed-hirsute; spikes commonly ternate, naked or rarely with 1 or 2 bracts at base, mostly 5–10, rarely 20 cm. long; corolla conspicuous, 4–7 mm. broad; fruiting calyx 3–6 mm. long, ovoid, or ovoid-oblong, the lower becoming distant; pedicels about 0.5 mm. long; lobes linear to linear-lanceolate, connivent above with the tips spreading, densely appressed-hirsute on the margins, midribs but little thickened, beset with spreading whitish or slightly yellowish bristles; nutlets 4, or sometimes fewer by abortion, pale, ovoid, acute, 2–3 mm. long, very finely muriculate, with a few low rounded papillae interspersed, low-convex on the back, rounded on the margins; groove closed or very narrow, broadly forked at base; style reaching to about four-fifths the height of nutlets.

Usually in sandy or rocky situations, Upper Sonoran and Arid Transition Zones; British Columbia to Idaho, south mainly east of the Cascades to southern Oregon and northeastern California. Type locality: Potlatch River, Idaho. May–July.

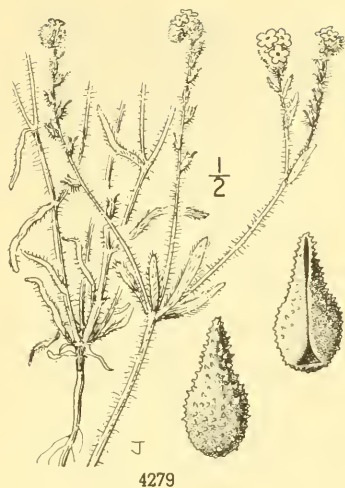
24. *Cryptantha simulans* Greene. Pine *Cryptantha*. Fig. 4288.

Cryptantha simulans Greene, *Pittonia* 5: 54. 1902.

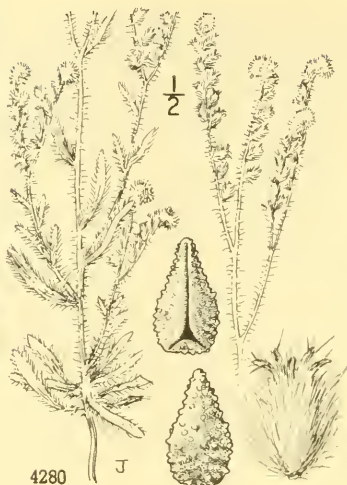
Cryptantha Steubelii Brand, *Rep. Spec. Nov.* 24: 58. 1927.

Cryptantha ambigua f. *simulans* Brand, *Pflanzenreich* 4²⁵²: 68. 1931.

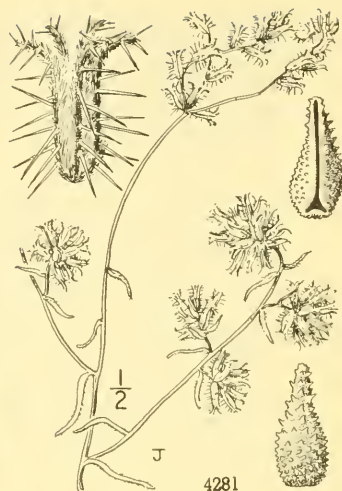
Stems erect with few ascending branches, 1.5–4 dm. high, the surface pallid beneath the strigose whitish hairs. Leaves linear to linear-oblanceolate, 1–3 cm. long, strigose on both sides; spikes solitary or frequently in twos or threes, usually elongate and sparsely flowered, bractless, corolla 0.5–1.5 mm. broad; fruiting calyx-lobes linear-lanceolate, connivent above with the tips spreading, midrib armed with reflexed or spreading-arcuate bristles, margin villous-hirsute with ascending hairs; nutlets 4, all similar, 2–2.5 mm. long, broadly ovoid, tes-



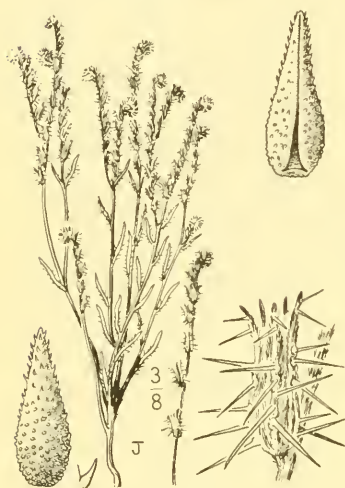
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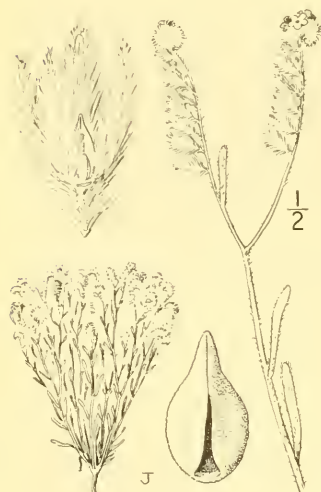
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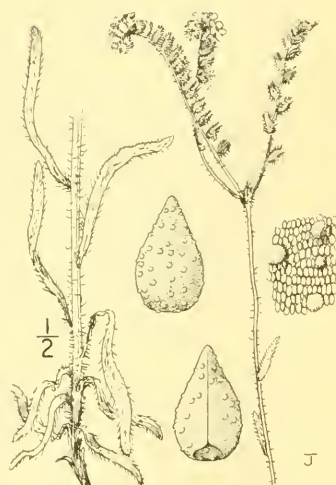
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4279. *Cryptantha intermedia*
 4280. *Cryptantha barbiger*
 4281. *Cryptantha nevadensis*

4282. *Cryptantha scoparia*
 4283. *Cryptantha muricata*
 4284. *Cryptantha excavata*

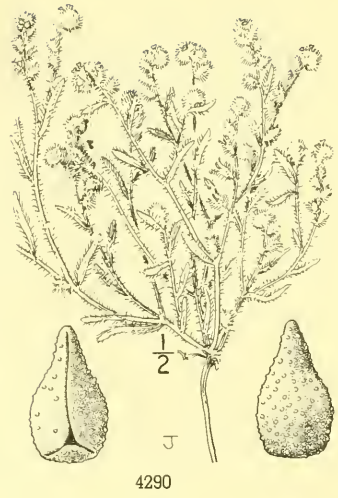
4285. *Cryptantha crinita*
 4286. *Cryptantha Milobakeri*
 4287. *Cryptantha Hendersonii*



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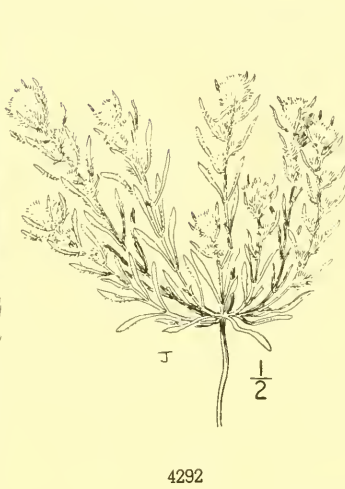
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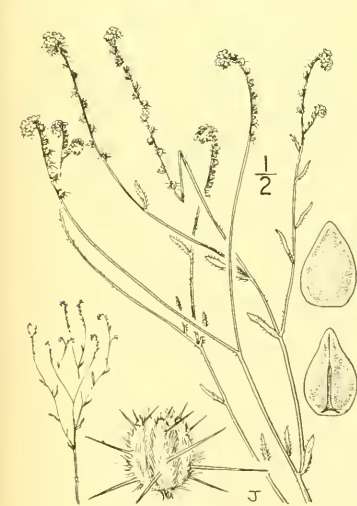
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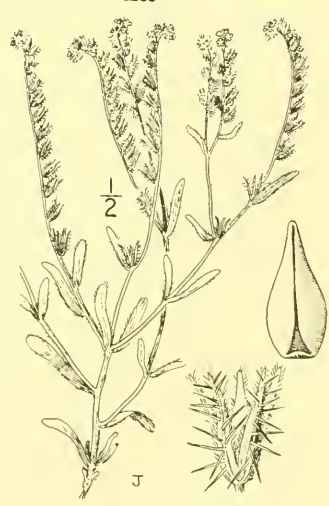
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4288. *Cryptantha simulans*
4289. *Cryptantha echinella*
4290. *Cryptantha ambigua*

4291. *Cryptantha Traskiae*
4292. *Cryptantha Hooveri*
4293. *Cryptantha Torreyana*

4294. *Cryptantha incana*
4295. *Cryptantha grandiflora*
4296. *Cryptantha mariposae*

sellate-papillate, angles rounded, ventral groove broadly forked below and closed throughout; style a little shorter than the nutlets.

Dry sandy or gravelly slopes or flats, in open pine forests, Arid Transition Zone; locally in southern Washington and Western Idaho; generally from Klamath County, southern Oregon, south to the Trinity Mountains, California, and through the Sierra Nevada and southern California ranges to the Cuyamaca Mountains. Type locality: Amador County, California. May-July.

25. *Cryptantha echinella* Greene. Prickly *Cryptantha*. Fig. 4289.

Cryptantha echinella Greene, Pittonia 1: 115. 1887.

Cryptantha ambigua var. *echinella* Jepson & Hoover, Fl. Calif. 3: 336. 1943.

Stems erect, sparsely branched, 0.5-3 or rarely 4 dm. high, short-hirsute to hirsute-hispid. Leaves linear-oblancoale to oblanceolate, 1-4 cm. long, obtusish, appressed-hispid, minutely pustulate; spikes solitary or geminate, often leafy-bracted below, 1-5 cm. long; corolla inconspicuous, 1-1.5 mm. rarely about 2 mm. broad; fruiting calyx oblong-ovoid, spreading, 5-6 mm. long; mature calyx-lobes linear-lanceolate, connivent above, the tips usually recurved, midrib prominently pale-tawny hispid, margins appressed-hirsutulous; nutlets 4, broadly ovoid, 2 mm. long, grayish and conspicuously papillate-echinate, rounded on the back, groove closed or very narrowly open, widely forked at base; style slightly surpassed by nutlet.

Flats and dry ridges, Canadian and upper Arid Transition Zones; Sierra Nevada, from Nevada County south to the San Bernardino and Panamint Mountains, California, and east to the Charleston Mountains, Nevada. Type locality: Mount Stanford, above Donner Lake, Nevada County, California. July-Aug.

26. *Cryptantha ambigua* (A. Gray) Greene. Wilkes' *Cryptantha*. Fig. 4290.

Eritrichium muriculatum var. *ambiguum* A. Gray, Syn. Fl. N. Amer. 2¹: 194. 1878.

Krynitzkia ambigua A. Gray, Proc. Amer. Acad. 20: 273. 1885.

Cryptantha ambigua Greene, Pittonia 1: 113. 1887.

Cryptantha polycarpa Greene, op. cit. 114.

Cryptantha multicaulis A. Nels. Bot. Gaz. 30: 194. 1900.

Cryptantha ambigua var. *robustior* Brand, Pflanzenreich 4²⁵²: 69. 1931.

Stems usually loosely branched from the base, ascending, 10-25 cm. high, hirsute and somewhat strigose. Leaves linear to narrowly lanceolate, 2-3 cm. or rarely 5 cm. long, 1-4 mm. wide, obtuse to acutish, more or less appressed hispid-hirsute, the hairs usually pustulate at base; spikes often solitary, 5-15 cm. long, bractless or the lowermost flowers sometimes bracteate; corolla 1-2 mm. broad; fruiting calyx 4-7 mm. long, crowded or distant, tube rounded-obconic at base, lobes linear or linear-lanceolate, more or less connivent, midrib thickened, tawny-hispid, margins strigose-hirsute; nutlets 4, broadly ovoid, 1.6-2 mm. long, granulate and tuberculate or rarely nearly smooth toward the base, sides obtuse and rounded, groove closed or somewhat dilated at the always forked base; gynobase two-thirds the length of the nutlet; style reaching to the apex of nutlet or a little shorter.

Dry slopes and ridges, open pine forests and sagebrush, Arid Transition Zone; Klickitat and Walla Walla Counties, Washington, south through eastern Oregon and eastern sides of the Sierra Nevada to Nevada County, California, east to western Montana, Wyoming, and Utah. Type locality: probably in the Walla Walla region of southeastern Washington. Type collected by the Wilkes Expedition. (I. M. Johnston, Contr. Gray Herb. No. 74: 83-85. 1925.) June-July.

27. *Cryptantha Traskiae* I. M. Johnston. Trask's *Cryptantha*. Fig. 4291.

Cryptantha Traskiae I. M. Johnston, Contr. Gray Herb. No. 74: 77. 1925.

Cryptantha Torreyana var. *Traskiae* Jepson, Fl. Calif. 3: 351. 1943.

Stems 8-20 cm. high, with few to rather numerous slender laxly ascending branches, strigose or with also a few spreading hairs. Leaves linear, 0.5-2 cm. long, 1-1.5 mm. broad, acute, strigose or hispidulous; spikes solitary or geminate, 1-5 cm. long; lower flowers subtended by narrowly linear bracts; corolla inconspicuous, limb spreading, 1.5-2 mm. broad; fruiting calyx subsessile, 2-3 mm. long; mature lobes linear-lanceolate, appressed-hirsutulous on the margin, midrib armed with short, divergent, usually yellowish bristles; nutlets 4, homomorphous, 1.5 mm. long, ovoid, finely tuberculate throughout or only toward the apex, more or less mottled gray and brown, dorsal side low-convex, margins rounded; groove narrow, extended to the apex, dilated at base into a narrowly triangular areola.

Gravelly or rocky soils, Upper Sonoran Zone; San Nicolas and San Clemente Islands, southern California. Type locality: bare wind-swept cliffs, San Nicolas Island. April-July.

28. *Cryptantha Hooveri* I. M. Johnston. Hoover's *Cryptantha*. Fig. 4292.

Cryptantha Hooveri I. M. Johnston, Journ. Arnold Arb. 18: 23. 1937.

Stems solitary or branched at the base, branches acute or the outer ones often decumbent at base, 5-15 cm. high, rather densely strigose with whitish hairs, more or less purple-staining at base. Basal leaves narrowly spatulate, 1-2.5 cm. long, obtuse or acutish; cauline leaves ascending, narrowly linear, about 1 mm. wide, acute, revolute on the margins, hispidulous with appressed or ascending hairs, or on the uppermost leaves hirsute-hispidulous; flowers solitary or in glomerules in the axils of the leaves, forming a narrow elongated and rather dense thyrus or panicle; corolla inconspicuous, tubular, 2-2.5 mm. long; fruiting calyx 4-5 mm. long, lobes linear, densely ascending-villous on the margins, midrib with several straight yellowish bristles; nutlets 4, homomorphic, triangular-ovoid, about 1.5 mm. long, acute at the apex,

dorsal side convex, prominently papillate, ventral side sparsely tuberculate; groove very narrow above, abruptly dilated at base into a deltoid areola.

Sandy soil, Sonoran Zones; San Joaquin Valley, from Contra Costa County to Madera County, California. Type locality: eight miles west of Chowchilla, Madera County. April–May.

Cryptantha Clōkeyi I. M. Johnston, Journ. Arnold Arb. 20: 387. 1939. (*Cryptantha muricata* var. *Clōkeyi* Jepson, Fl. Calif. 3: 338. 1943.) Stems 10–15 cm. high, erect, usually with ascending branches from near the middle. Leaves toward the base linear-lanceolate, 2–3 cm. long, 2 mm. broad, pilose, the hairs on the upper surface pectinate at base; spikes solitary or geminate, 3–6 cm. long; fruiting calyx 7–10 mm. long, the lobes long-attenuate; corolla-limb 2 mm. wide; nutlets triangular-ovoid, about 3 mm. long, minutely granulate and conspicuously papillate or tuberculate, the groove closed or open, furcate at base; style distinctly exserted above the nutlet. Type locality: "north of Barstow, San Bernardino Co., 2800 ft." "The plant is probably rare and local since Mr. Clōkey has failed to rediscover it along the road north of Barstow where he originally found it."

29. *Cryptantha Torreyana* (A. Gray) Greene. Torrey's *Cryptantha*. Fig. 4293.

Krynitzkia Torreyana A. Gray, Proc. Amer. Acad. 20: 271. 1885.

Krynitzkia Torreyana var. *calycosa* A. Gray, loc. cit.

Cryptantha Torreyana Greene, Pittonia 1: 118. 1887.

Cryptantha calycosa Rydb. Mem. N.Y. Bot. Gard. 1: 331. 1900.

Cryptantha flexuosa A. Nels. in Coult. & Nels. Man. Bot. Rocky Mts. 416. 1909.

Cryptantha Torreyana var. *calistogae* I. M. Johnston, Contr. Gray Herb. No. 74: 80. 1925.

Stems erect, 1–4 dm. high, solitary or several with erect or more often spreading branches, finely strigose and sparsely hirsutulous. Leaves oblanceolate to linear, erect or spreading, obtuse or rounded at apex, 2–5 cm. long, hirsutulous; spikes commonly geminate, bractless, becoming elongated and loosely flowered or sometimes remaining congested and glomerate; corolla inconspicuous, lobes short, ascending; fruiting calyx ovoid or oblong-ovoid, 3–7 mm. long; mature calyx-lobes linear-lanceolate, connivent above with tips usually spreading, midrib somewhat thickened below, bristly-hispid, margins appressed-hirsute; nutlets usually 4, broadly ovoid, smooth and shiny, often mottled, almost flat on the back, sides rounded or obtuse; groove broadly forked below, closed throughout.

Open slopes or in partial shade, mainly Transition Zones; southern Alaska and British Columbia southward through the Pacific States on both sides of the Cascades to Marin County, California, in the Coast Ranges and to Kern County in the Sierra Nevada, east to Idaho, Nevada, Utah and Wyoming. Type locality: Yosemite Valley (*Torrey* 337), according to I. M. Johnston, Contr. Gray Herb. No. 74: 81. 1925. May–Aug.

Cryptantha Torreyana var. *pumila* (Heller) I. M. Johnston, Contr. Gray Herb. No. 74: 80. 1925. (*Cryptantha pumila* Heller, Muhlenbergia 2: 242. 1906.) Plants 1–2 dm. high, usually conspicuously spreading-hirsute; fruiting calyx 2–3.5 mm. long. Marin, Contra Costa and Santa Clara Counties, California. Type locality: "near the summit of Mt. Tamalpais, Marin County."

30. *Cryptantha incana* Greene. Tulare *Cryptantha*. Fig. 4294.

Cryptantha incana Greene, Leaflets Bot. Obs. 1: 79. 1904.

Cryptantha Torreyana var. *incana* Jepson, Man. Fl. Calif. 850. 1925.

Stems slender, with several ascending branches, 15–45 cm. high, cinereous-hispidulous and minutely strigose. Leaves linear or sometimes narrowly linear-oblanceolate, appressed-hispidulous; spikes geminate, bractless, elongate and slender in fruit; corolla 4 mm. broad; fruiting calyx more or less ascending, 2–2.5 mm. long, tips of the lobes erect, not attenuate, hirsutulous-hispidulous with ascending hairs, the abaxial lobe especially with 1 or few straight spreading bristles; ovules 4; nutlets 2, ovoid-lanceolate, rounded below, rather abruptly attenuate at apex, 1.5 to nearly 2 mm. long, smooth and polished, grayish mottled with brown.

Dry ground, Arid Transition Zone; southern Sierra Nevada, Tulare County, California. Type locality: Nine-Mile Creek, altitude 5,800 feet. June–Aug.

31. *Cryptantha grandiflora* Rydb. Clearwater *Cryptantha*. Fig. 4295.

Cryptantha grandiflora Rydb. Bull. Torrey Club 36: 679. 1909.

Cryptantha hispidula var. *Elmeri* Brand, Pflanzenreich 4²⁵²: 60. 1931.

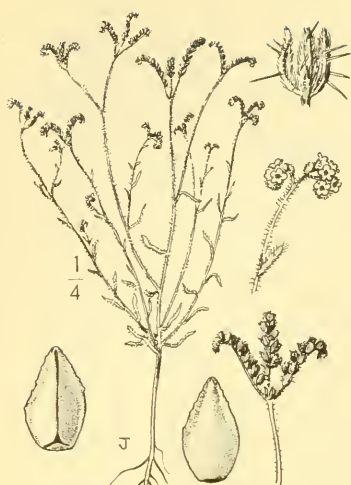
Stems 1.5–4 dm. high, with 2 to several ascending branches, whitish-hirsute. Leaves broadly linear, lanceolate or oblong, 2–5 cm. long, 2–5 mm. wide, hirsute, the hairs with pustulate bases; spikes becoming lax and 5–10 cm. long in fruit; calyx-lobes 2.5–3 mm. long, becoming 4–5 mm. long in fruit, very hispid; corolla white with yellow crests, 3.5–4 mm. long, the limb 5–6 mm. wide; nutlets 1 or 2, ovoid, 2.5 mm. long, dark-colored, smooth and shining, groove narrow, 2-forked at base.

Gravelly or stony ground, Arid Transition Zone; Kittitas and Whitman Counties, Washington, to the Wallowa Mountains, northeastern Oregon, and east to western Idaho. Type locality: "Valley of Clearwater River," Nez Perces County, Idaho. April–June.

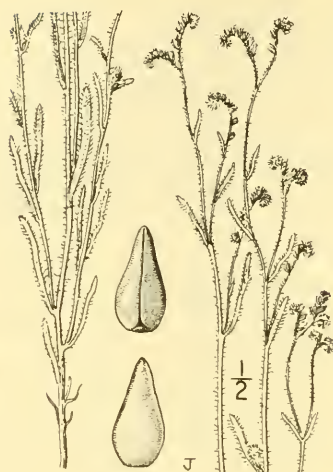
32. *Cryptantha mariposae* I. M. Johnston. Mariposa *Cryptantha*. Fig. 4296.

Cryptantha mariposae I. M. Johnston, Contr. Gray Herb. No. 74: 73. 1925.

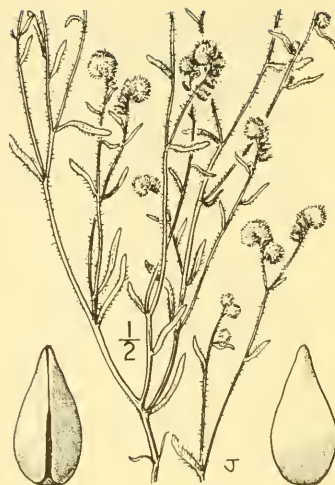
Stems erect, with few to several ascending branches, 7–20 cm. high or, in dwarf plants sometimes simple, the larger more or less corymbosely branched, rather finely and closely strigose. Leaves oblong or the upper sometimes oblong-lanceolate, 8–18 mm. long, both sides hirsute with mostly ascending hairs with rather obscurely pustulate bases; spikes solitary or in pairs, bractless or the lowest flower sometimes bracteate; corolla about 2 mm. broad; fruiting calyx 4–5 mm. long and about half as broad, the lobes linear-subulate, erect, with slightly spreading tips, villous on the sides with ascending hairs and conspicuously setose-hispid with



4297



4298



4299



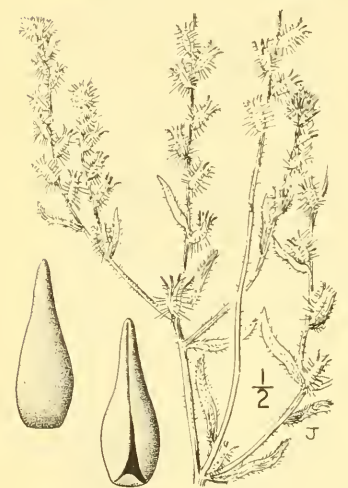
4300



4301



4302



4303



4304



4305

4297. *Cryptantha mohavensis*
 4298. *Cryptantha Watsonii*
 4299. *Cryptantha gracilis*

4300. *Cryptantha Fendleri*
 4301. *Cryptantha leiocarpa*
 4302. *Cryptantha Clevelandii*

4303. *Cryptantha Ganderi*
 4304. *Cryptantha hispidula*
 4305. *Cryptantha microstachys*

spreading bristles on the prominent midrib; nutlets 4, or rarely 2-3, ovoid below, abruptly narrowed above into an attenuate beak, rounded dorsally on the body but becoming angled upward into the beak, brownish or mottled, shining, thinly or rather thickly muricate-tuberculate; ventral groove narrow, opening into a rounded open scar at base.

Serpentine outcrops, Upper Sonoran Zone; Sierra Nevada foothills from Calaveras County to Mariposa County, California. Type locality: "Mariposa County." April-May.

33. *Cryptantha mohavensis* Greene. Mojave *Cryptantha*. Fig. 4297.

Krynitzkia mohavensis Greene, Bull. Calif. Acad. 1: 207. 1885.

Cryptantha mohavensis Greene, Pittonia 1: 120. 1887.

Cryptantha fallax Greene, op. cit. 5: 54. 1902.

Stems erect and usually well-branched, 1-4 dm. high, short-hirsute with spreading or, especially on the upper parts, ascending hairs. Leaves narrowly linear to linear-lanceolate, hirsute-hispid with rather short more or less ascending hairs, minutely pustulate; spikes in twos or threes, usually crowded, 2-6 cm. long, bractless; corolla 4-7 mm. broad; fruiting calyx oblong-ovoid, 3-5 mm. long; mature calyx-lobes lanceolate, connivent above, margins appressed silky-pubescent, midrib sparsely hispid; nutlets 4, all similar, smooth and shining, rarely obscurely tessellate, oblong-ovoid to lanceolate-ovoid, 2-2.5 mm. long, flattish dorsally, lateral angles obtuse, groove closed above, forked below and often forming a small triangular areola; style distinctly surpassing the nutlets.

Sandy soils, Upper Sonoran Zone; eastern base of the Sierra Nevada near Bishop, Inyo County, California, and Tehachapi Mountains south to the desert slopes of the Sierra Liebre and San Gabriel Mountains, California. Type locality: "Mojave Desert." May-June.

34. *Cryptantha Watsonii* (A. Gray) Greene. Watson's *Cryptantha*. Fig. 4298.

Krynitzkia Watsonii A. Gray, Proc. Amer. Acad. 20: 271. 1885.

Cryptantha Watsonii Greene, Pittonia 1: 120. 1887.

Cryptantha vincens Nels. & Macbr. Bot. Gaz. 62: 143. 1916.

Stems slender, solitary and usually strictly branched, 1-3 dm. high, spreading, short-hirsute. Leaves narrowly linear to narrowly oblanceolate, ascending, hirsute, rarely pustulate; spikes solitary or in pairs, 1-4 cm. long, rarely longer, bractless or rarely bracted below; corolla about 1 mm. broad; fruiting calyx ovoid to oblong-ovoid, 2-3.5 mm. long, the lower becoming distant; mature calyx-lobes lanceolate, the tips connivent, hirsute with ascending hairs, the midrib also with a few spreading bristles; nutlets 4, all similar, lanceolate, 1.5-2 mm. long, smooth and shiny or sometimes dull and minutely tessellate, nearly flat on the dorsal side, distinctly angled on the margins, groove forked at base, closed or nearly so; style equaling or a little shorter than the nutlets.

Slopes and flats, in dry rocky or sandy soils, Arid Transition Zone; east of the Cascades from Okanogan County, Washington, south through Oregon and Nevada to Inyo County, California, east to Montana and Utah. Type locality: Wasatch Mountains, Utah. May-Sept.

35. *Cryptantha grácilis* Osterhout. Slender *Cryptantha*. Fig. 4299.

Cryptantha gracilis Osterhout, Bull. Torrey Club 30: 236. 1903.

Cryptantha Hillmanii Nels. & Kenn. Proc. Biol. Soc. Wash. 19: 157. 1906.

Cryptantha gracilis var. *Hillmanii* Munz & Jtn. Bull. Torrey Club 49: 39. 1922.

Stems slender, simple with ascending branches above or frequently with several elongated branches below, 1-2 dm. high, rather densely hirsute-hispid with rather short spreading hairs. Leaves linear or narrowly oblanceolate, the lower 1.5-3 cm. long, the upper usually much reduced, pubescence similar to that on the stem but usually pustulate; spikelets solitary or in pairs, 1-2 cm. long, usually dense, bractless; corolla 1 mm. or less in width; fruiting calyx ovoid, divaricately spreading, 2-3 mm. long; mature calyx-lobes lanceolate, erect at apex, rather densely tawny hirsute-villous, midrib with a few hirsute-hispid bristles not strongly differentiated from the rest of the pubescence; nutlets 1 or rarely 2-3 and unequally developed, lanceolate, 1.5-2 mm. long, smooth and shiny, nearly flat on dorsal side, sides rounded at least above, groove usually open to above the middle, scarcely forked below; style about three-fourths the height of the nutlet.

Dry, usually brushy slopes, Upper Sonoran Zone; White Mountains, Inyo County and the higher ranges of eastern Mojave Desert, California, east through Nevada and northern Arizona to Snake River, Idaho, and Colorado. Type locality: Glenwood Springs, Colorado. April-July.

36. *Cryptantha Fendleri* (A. Gray) Greene. Fendler's *Cryptantha*. Fig. 4300.

Krynitzkia Fendleri A. Gray, Proc. Amer. Acad. 20: 268. 1885.

Eriochium hispidum var. *leiocarpum* Kuntze, Rev. Gen. Pl. 2: 437. 1891.

Cryptantha ramulosissima A. Nels. Erythea 7: 68. 1899.

Cryptantha wyomingensis Gandoger, Bull. Soc. Bot. Fr. 65: 62. 1918.

Stem erect, usually evident throughout and bearing lateral branches mostly above the middle, sometimes rather bushy-branched from near the base, 1-5 dm. high, rather densely and conspicuously hirsute-hispid with more or less ascending hairs. Leaves narrowly linear to narrowly oblanceolate, acute, appressed-hirsute, often pustulate on the lower surface; spikes solitary or in pairs, 2-12 cm. long, loosely flowered, bractless or rarely bracted below; corolla about 1 mm. broad; fruiting calyx ovate-oblong, 4-5 or rarely 6-7 mm. long, ascending; mature calyx-lobes loosely connivent with the tips somewhat spreading, margins white-hirsute with

ascending hairs, midrib hispid; nutlets 4, all similar, or sometimes reduced to 1-3, smooth and somewhat shiny, lanceolate, acuminate, convex on dorsal face, rounded or obtuse on the sides, groove closed above, opening below into a deltoid areola; style equaling or slightly surpassing the nutlets.

Usually on sagebrush plains, Upper Sonoran and Arid Transition Zones; southeastern Washington and northeastern Oregon, east to Saskatchewan and western Nebraska, and south to northern Arizona and New Mexico. Type locality: New Mexico. June-Aug.

37. *Cryptantha leiocarpa* (Fisch. & Mey.) Greene. Coast *Cryptantha*. Fig. 4301.

Echinosperrum leiocarpum Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 36. 1835.

Krynitzkia leiocarpa Fisch. & Mey. op. cit. 7: 52. 1841.

Eritrichium leiocarpum S. Wats. Bot. King Expl. 244. 1871.

Cryptantha leiocarpa Greene, Pittonia 1: 117. 1887.

Cryptantha leiocarpa var. *eremocaryoides* Brand, Pflanzenreich 4²²: 53. 1931.

Stems at first erect, later commonly widely branched from the base and more or less decumbent, 1-3 dm. long, more or less densely hirsute-hispid, with white appressed or ascending hairs. Leaves linear or sometimes oblanceolate, usually narrowly so, ascending, acute or obtuse, appressed pilose-hispid on both sides; spikes usually numerous, those on the short lateral branchlets usually short and congested, those terminating the principal branches often in pairs and becoming 2-4 cm. or rarely 6 cm. long and conspicuously leafy-bracted; corolla 1-2.5 mm. broad; fruiting calyx ovoid to oblong-ovoid, 2-3 mm. long, crowded or becoming loose below; mature calyx-lobes somewhat connivent above, midrib thickened, conspicuously tawny-hispid with spreading bristles, margins appressed-hirsute; nutlets 4, rarely reduced to 1 by abortion, ovoid-lanceolate, 2 mm. long, smooth, shiny, usually mottled with brown and light gray, rounded on the back, ventral side obtusely rounded, margin obtuse, groove closed to the base, obscurely or commonly not at all forked at base; style equaling or slightly surpassing the nutlets.

Sandy soils along the coast, mainly Humid Transition Zone; Gold Beach, southern Oregon to Surf, Santa Barbara County, California. Type locality: Fort Ross, California. April-June.

38. *Cryptantha Clevelandii* Greene. Cleveland's *Cryptantha*. Fig. 4302.

Cryptantha Clevelandii Greene, Pittonia, 1: 117. 1887.

Cryptantha Brandegei I. M. Johnston, Contr. Gray Herb. No. 68: 53. 1923.

Cryptantha Abramsii I. M. Johnston, op. cit. No. 74: 97. 1925.

Stems erect or sometimes decumbent, 1-5 dm. high, usually with several elongated ascending or spreading branches, hispidulous with appressed or ascending hairs. Leaves usually dense at base, sparsely scattered above and on the branches, linear to linear-lanceolate, mostly acutish, rather thinly appressed-hispidulous and usually with a few stouter bristles on margins; spikes solitary at the ends of the branches or in twos or threes, 4-10 cm. long, slender, bractless with 1 or 2 bracts at base; corolla about 1 mm. broad; fruiting calyx ovoid to ovoid-oblong, 2-3 mm. long; mature calyx-lobes linear or narrowly linear-lanceolate, connivent above with the tips spreading, outer ones conspicuously hispid on the thickened midribs, all the lobes densely whitish appressed-hirsutulous; nutlets 1-4, ovate-oblong to broadly lanceolate, smooth and shining, low-rounded on the back, groove closed, broadly forked at base or rarely with a small areola; style about two-thirds to as long as nutlets or slightly surpassing them.

Hillside and mountain slopes, Upper Sonoran Zone; cismontane southern California from the vicinity of Los Angeles to northern Lower California. Type locality: San Diego, California. April-June.

Cryptantha Clevelandii var. *florosa* I. M. Johnston, Contr. Gray Herb. No. 74: 95. 1925. (*Cryptantha hispidissima* Greene, Pittonia 1: 118. 1887; *C. Clevelandii* var. *hispidissima* I. M. Johnston in Munz, Man. S. Calif. 427. 1935.) Plants usually stouter, spreading or erect, often conspicuously hispid with spreading hairs; spikes in twos or threes at the ends of leafless or sparingly leafy peduncles, bractless or with a few bracts at base; corolla 2-5 mm. broad. California Coast Ranges from San Luis Obispo to San Diego, but infrequently found as far north as Santa Cruz County. Type locality: Linda Vista, San Diego County.

Cryptantha Clevelandii var. *dissita* (I. M. Johnston) Jepson & Hoover in Jepson, Fl. Calif. 3: 348. 1943. (*Cryptantha dissita* I. M. Johnston, Journ. Arnold Arb. 20: 383. 1939.) Stems rather stout with ascending branches, villous-hirsute; corolla 4-6 mm. broad; fruiting calyx 5-6 mm. long; nutlets 1-3, ovate-lanceolate; style slightly exceeding the nutlets. Tufaceous and serpentine outcrops in the vicinity of Lakeport, Lake County, California. Type locality: near foot of grade a few miles west of Lakeport on road to Hopland.

39. *Cryptantha Gánderi* I. M. Johnston. Gander's *Cryptantha*. Fig. 4303.

Cryptantha Ganderi I. M. Johnston, Journ. Arnold Arb. 20: 386. 1939.

Stem 1-4 dm. high, branching from the base and more or less dichotomously above, hirsute-hispid with spreading hairs of different length. Leaves linear, acute or obtuse, rather thinly hispidulous, the hairs, especially those on the lower, pubescent at base; spikes solitary, terminal or from the axils of the upper leaves, bractless, 5-15 cm. long and loosely flowered in age; corolla inconspicuous, 2.5 cm. long, lobes narrow, erect; fruiting calyx subsessile, ascending, accrescent, 6-10 mm. long, lobes narrowly linear, erect, margins very narrow, the costate midrib with conspicuous yellowish, spreading or deflexed bristles; ovules 4, usually 1 fertile and 3 abortive; nutlets lanceolate, acuminate, 2-2.5 mm. long, smooth or faintly rugulose, shiny, grayish brown and rather obscurely mottled, convex on the back, margins rounded, ventral side broadly obtuse; groove closed above, forked at base into a narrow triangular areola.

Desert washes and hills, Lower Sonoran Zone; Colorado Desert, San Diego County, California, and northern Lower California. Type locality: "Borego Valley, Larrea-Franseria association, 500 ft. alt." San Diego County. Feb.-May.

40. *Cryptantha hispídula* Greene. Napa *Cryptantha*. Fig. 4304.

Cryptantha hispídula Greene ex Baker, West. Amer. Pl. 2: 10. 1903. Nomen nudum.

Cryptantha hispídula Greene ex Brand, Pflanzenreich 4²²: 60. 1931.

Stems erect, slender, 1-4 dm. high, widely branched above the base, strigose and spreading-hirsutulous. Leaves linear or the lower narrowly oblanceolate, 0.7-1.5 cm. long, spreading-hispidulous, more or less pustulate; spikes geminate or ternate or occasionally solitary, becoming loosely flowered and often 5-7 cm. long; corolla 2-2.5 mm. broad; fruiting calyx 2-2.5 mm. ascending, connivent with the tips spreading; mature calyx-lobes linear, conspicuously hispid on the midrib, the tips and margins appressed-hispidulous; nutlet 1, smooth and polished, ovate or lanceolate, narrowed above into a slender beak, well-rounded on both sides; groove open, shortly forked at base; style shorter than the nutlet.

Serpentine outcrops, Upper Sonoran Zone; Inner Coast Ranges, Lake and Napa Counties, California. Type locality: Knoxville, Napa County. April-June.

41. *Cryptantha microstachys* Greene. Tejon *Cryptantha*. Fig. 4305.

Krynitzkia microstachys Greene ex A. Gray, Proc. Amer. Acad. 20: 269. 1885.

Cryptantha microstachys Greene, Pittonia 1: 116. 1887.

Stems erect, slender-branched from the base or above, 8-30 cm. high, hirsute-hispidulous with spreading or more or less ascending hairs. Leaves spreading, linear to linear-lanceolate, 1-4 cm. long, obtuse, hirsute-hispidulous or rarely strigose, sparsely ciliate-hispid on the margins and the midrib beneath; spikes geminate or ternate, in age loosely flowered and very slender, 2.5-8 cm. long; corolla 0.5-1 mm. broad; fruiting calyx ascending, 1-2 mm. long, oblong or slightly connivent and tips slightly spreading; calyx-lobes narrowly linear-lanceolate, thinly strigose and greenish with a few spreading bristles on the midrib and usually 1 or 2 erect ones at the tip; nutlet 1, lanceolate or ovate-attenuate, 1.5 mm. long, smooth and polished, rounded on the dorsal side, the ventral side rounded or slightly 2-planed; groove closed, simple or shortly forked at very base.

Common in chaparral, Upper Sonoran Zone; Coast Ranges from Glenn County south to San Diego County, also Sierra Nevada in Kern County, California. Type locality: Fort Tejon, Kern County. April-June.

42. *Cryptantha nemáclada* Greene. Colusa *Cryptantha*. Fig. 4306.

Cryptantha nemaclada Greene, Pittonia 1: 118. 1887.

Stems slender, erect and usually much-branched, 1-3 dm. high, sparsely strigose, and more or less short-hirsute. Leaves narrowly linear, 1-3 cm. long, obtuse, ascending or somewhat appressed, appressed-hirsutulous, minutely pustulate; spikes solitary or geminate, bractless, slender, becoming loosely flowered and 2-9 cm. long; corolla minute, less than 1 mm. broad; fruiting calyx oblong-ovoid, strictly ascending, 2-4 mm. long; mature calyx-lobes linear, connivent above with tips spreading, midrib thickened, conspicuously hispid toward the base, retrorsely setulose toward the apex, margins sparsely strigose; nutlets 1-4, lanceolate to ovoid-lanceolate, 1.7-2 mm. long, smooth, convex on the back, obtuse on the sides, groove opened or closed above, broadly forked below; style reaching to about three-fourths the length of the nutlet.

Hillsides and shaded banks, Upper Sonoran Zone; Inner Coast Ranges and bordering valleys, Colusa County south to San Luis Obispo County and the Tehachapi Mountains, California. Type locality: "Colusa County." April-May.

43. *Cryptantha rostelläta* Greene. Beaked *Cryptantha*. Fig. 4307.

Krynitzkia rostellata Greene, Bull. Calif. Acad. 1: 203. 1885.

Cryptantha rostellata Greene, Pittonia 1: 116. 1887.

Krynitzkia Suksdorfii Greenm. Bot. Gaz. 40: 146. 1905.

Cryptantha Suksdorfii Piper, Contr. U.S. Nat. Herb. 11: 484. 1906.

Stems stiffly erect, branched below or more often simple below with a few ascending branches toward the top, rather finely strigose and canescent. Leaves rather abundant along main stem, ascending, firm and persistent, usually opposite below the middle, narrowly linear but more often oblanceolate and 2-3 mm. wide; spikes solitary or geminate, rather stiff, naked, 2-4 cm. long; corolla minute, 1 mm. or less broad; fruiting calyx oblong-ovate, 3-4 mm. long, spreading or ascending, fairly persistent; mature calyx-lobes with midrib on all lobes armed with stout, encrusted uncinatate or arcuate hairs, margins sparsely ciliate or strigose; only 1 nutlet maturing, smooth, compressed ovate-lanceolate to lanceolate, 2-3 mm. long, convex dorsally, rounded on the sides, truncate at base; groove closed above, forked at base into a distinct areola; gynobase very short and stout; style one-half to one-third height of nutlet.

Foothills, Upper Sonoran Zone; Klickitat County, Washington, south to central California. Type locality: "Lake and Colusa Counties," California. Collected by Mrs. Curran. April-May.

Cryptantha rostellata var. *spithamea* (I. M. Johnston) Jepson, Fl. Calif. 3: 354. 1943. (*Cryptantha spithamea* I. M. Johnston, Journ. Arnold Arb. 20: 385. 1939.) The reflexed bristles on the lower part of the calyx are few or wanting. Foothills, Upper Sonoran Zone; Mariposa County, California. Type locality: Coulterville.

44. *Cryptantha flaccida* (Dougl.) Greene. Flaccid *Cryptantha*. Fig. 4308.

Myosotis flaccida Dougl. ex Lehm. Stirp. Pug. 2: 22. 1830.

Eritrichium oxycaryum A. Gray, Proc. Amer. Acad. 10: 58. 1874.

Krynitzkia oxycarya A. Gray, op. cit. 20: 269. 1885.

Cryptantha flaccida Greene, Pittonia 1: 115. 1887.

Cryptantha multicaule Howell, Fl. N.W. Amer. 487. 1901. Not A. Nels. 1900.

Cryptantha Howellii A. Nels. Bot. Gaz. 34: 30. 1902.

Cryptantha Lyallii Brand, Rep. Spec. Nov. 24: 57. 1927.

Stem strictly erect, ascendingly branched above, or sometimes from the base, 2–5 dm. high, strigose with encrusted hairs. Leaves very narrowly linear to linear-oblancoate, 2–6 cm. long, 1–2 or rarely 3 mm. wide, strict or ascending, rather densely and finely strigose; spikes solitary to quinate, naked, usually rather stiff, 4–8 cm. or as much as 16 cm. long; corolla 1–4 mm. broad; fruiting calyx oblong-ovoid, 2–5 mm. long, strictly and closely erect; mature calyx-lobes linear-lanceolate, closely connivent above with the tips spreading, midrib armed with spreading, coarse, encrusted, arcuate or uncinat bristles, margins ciliate or strigose, outer lobe longest and most conspicuously bristly; only 1 nutlet maturing, ovate-lanceolate and rostrate-acuminate, only slightly compressed, smooth; groove closed above, dilated at base to form a very small areola; gynobase very low and scarcely manifest; style one-third to one-half the height of the nutlet.

Hillslopes, Arid Transition and Upper Sonoran Zones; Washington and adjacent Idaho to southern California. Type locality: east of the Cascades in the Columbia River Basin. Collected by Douglas. April–June.

45. *Cryptantha sparsiflora* Greene. Slender *Cryptantha*. Fig. 4309.

Krynitzkia sparsiflora Greene, Bull. Calif. Acad. 1: 203. 1885.

Cryptantha sparsiflora Greene, Pittonia 1: 116. 1887.

Stem very slender, with usually few ascending branches, 1–3 dm. high, sparsely strigose. Leaves narrowly linear, 1–3 cm. long, about 1 mm. wide, strigose, the lower often opposite; spikes solitary or geminate, slender, becoming loosely flowered and 2–6 cm. long, bractless or sometimes with 1 or 2 bracts near the base; corolla minute, less than 1 mm. broad; fruiting calyx 2–3 mm. long, ovate to ovate-oblong, ascending, early deciduous; mature calyx-lobes linear-lanceolate, somewhat connivent, midrib armed with short, stout, uncinat hairs, margins sparsely ciliate; ovules 4, only 1 maturing; nutlet 1, ovate, acute or short-acuminate, decidedly compressed, smooth, 2 mm. long, low-convex dorsally, angled on the margin; groove closed and broadly forked near the base; gynobase low; style one-third to one-half the height of nutlet.

Rocky slopes, Upper Sonoran Zone; Inner Coast Ranges, Stanislaus and San Benito Counties and the foothills of the Sierra Nevada from Mariposa County to Kern County, California. Type locality: possibly in the Tehachapi Mountains. Collected by Mrs. Curran, but collecting data uncertain. April–May.

46. *Cryptantha affinis* (A. Gray) Greene. Common *Cryptantha*. Fig. 4310.

Krynitzkia affinis A. Gray, Proc. Amer. Acad. 20: 270. 1885.

Cryptantha affinis Greene, Pittonia 1: 119. 1887.

Cryptantha geminata Greene, loc. cit.

Cryptantha Eastwoodiae St. John, Fl. S.E. Washington 342. 1937.

Stems usually with few ascending branches mostly above the middle or sometimes more or less profusely branched from the base, 1–4 dm. high, pubescent throughout with short upwardly curved hairs and also with scattered ascending or spreading hirsute-hispid hairs. Leaves narrowly to broadly oblanceolate, mostly 3–6 mm. broad, obtuse or rounded at apex, rather sparsely short-hispid and minutely pustulate; spikes solitary or geminate, 2–8 cm. long or rarely longer, usually with a few foliaceous bracts below, becoming loosely flowered; corolla minute, about 1.5 mm. broad; fruiting calyx 2.5–4 mm. long, and about as broad, compressed; mature calyx-lobes somewhat connivent, midrib little thickened, on the outer lobe especially sparsely hispid, margins appressed-hirsute; nutlets 4, similar, smooth and polished, ovate, obliquely compressed, often mottled, 2–2.5 mm. long, low-convex on the back, rounded on the sides; groove distinctly eccentric, closed, simple or shortly forked at base; style shorter or nearly as high as the nutlets.

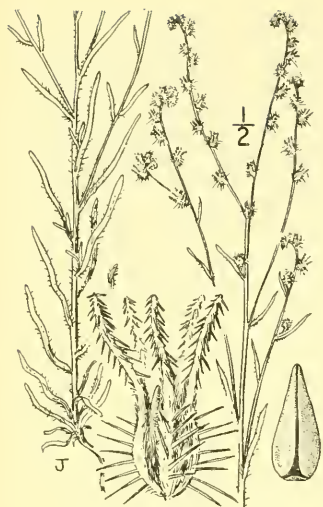
Usually in sandy or rocky soils, Arid Transition Zone; eastern Washington south, mainly east of the Cascades to eastern Oregon, the North Coast Ranges, and in the Siskiyou Mountains, and the Sierra Nevada, south to the Cuernaca Mountains, California, east to Idaho, Nevada, and Wyoming. Type locality: "E. side of the Cascades near lat. 49°." Collected by Lyall. June–Sept.

47. *Cryptantha glomeriflora* Greene. Truckee *Cryptantha*. Fig. 4311.

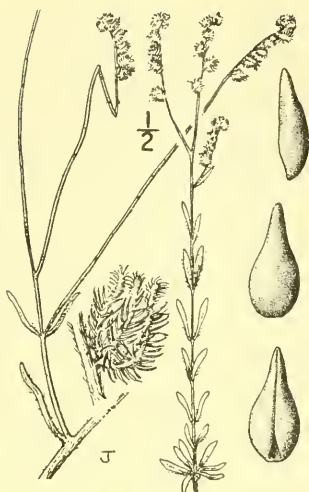
Cryptantha glomeriflora Greene, Pittonia 1: 116. 1887.

Stems erect with a few ascending branches, 3–10 cm. high, or commonly diffusely branched and spreading, whitish strigose. Leaves 5–15 mm. long, linear-oblong to lanceolate-oblong, appressed-hispidulous; flowers in glomerules or 2 or 3 in the axils of the leaves and at the ends of the branchlets; corolla minute, the lobes ascending; mature calyx 1–1.5 mm. long, lobes linear-lanceolate, hispidulous and bristly with stout straight bristles; nutlets solitary, ovate below, more or less abruptly attenuate at apex, smooth, shiny, light gray more or less speckled with brown, 1.5 mm. long, rounded on the back and somewhat keeled on the narrowed apex; ventral groove a little off center, closed, opening at base into the sunken areola.

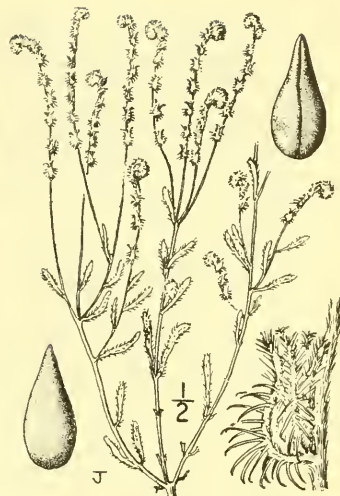
Mountain meadows and slopes, upper Arid Transition and Canadian Zones; Sierra Nevada from Nevada County to Tulare and Inyo Counties, also White Mountains, California. Type locality: "Borders of a pond two miles below Truckee," Nevada County, California. June–Sept.



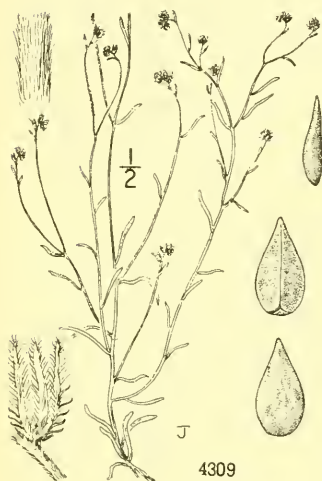
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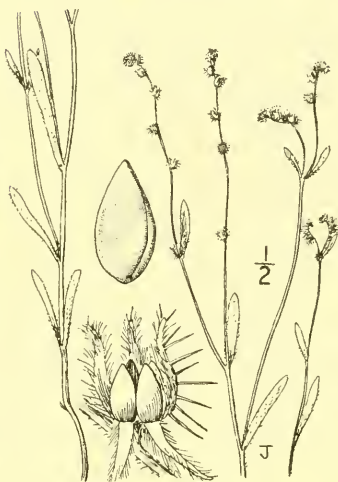
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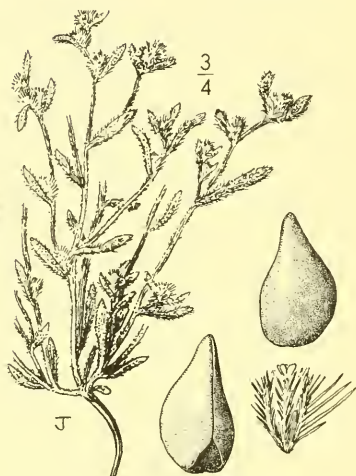
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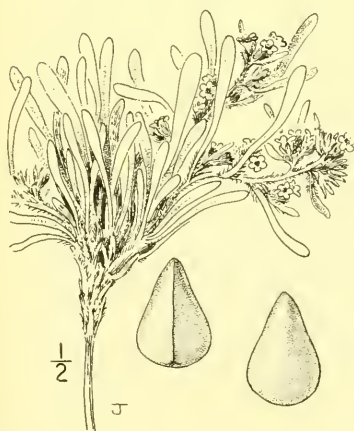
4309



4310



4311



4312



4313



4314

4306. *Cryptantha nemaclada*
 4307. *Cryptantha rostellata*
 4308. *Cryptantha flaccida*

4309. *Cryptantha sparsiflora*
 4310. *Cryptantha affinis*
 4311. *Cryptantha glomeriflora*

4312. *Oreocarya abortiva*
 4313. *Oreocarya confertiflora*
 4314. *Oreocarya leucophaea*

22. *OREOCARYA* Greene, Pittonia 1: 57. 1887.

Stout perennial herbs, canescent or pilose-hispid with the leaves mostly basal. Inflorescence leafy-bracteate thyrsoid or racemose-paniculate. Flowers in slender pedicels, persistent. Calyx 5-parted to the base, segments lanceolate. Corolla white or cream-colored with prominent often yellow crests. Nutlets smooth and polished or tuberculate or rugose and dull, the margins acute or sometimes very narrowly winged; groove usually closed, divaricate at base. [Name Greek, meaning mountain, because of the habitat, and nutlet.]

A genus of about 45 species inhabiting western North America. Type species, *Cynoglossum glomeratum* Pursh.

Nutlets smooth and shining on the dorsal surface.

Corolla-tube 3-4 mm. long, barely as long as calyx in anthesis, white.

1. *O. abortiva*.

Corolla-tube 8-12 mm. long, distinctly longer than calyx in anthesis.

Corolla yellow; nutlets broadly ovate in outline, distinctly wing-margined.

2. *O. confertiflora*.

Corolla white; nutlets lanceolate in outline, the margins acute not winged.

3. *O. leucophaea*.

Nutlets more or less roughened or wrinkled on the dorsal surface.

Corolla-tube about equaling or shorter than the calyx in anthesis.

Inner surface of nutlets smooth or nearly smooth; margin of scar not elevated.

Scar of nutlet narrowly subulate, but open at base.

Nutlets with conspicuous transverse rugae on upper surface.

Calyx 5-7 mm. long in fruit.

4. *O. subretusa*.

Calyx 13-15 mm. long in fruit.

5. *O. crymophila*.

Nutlets with distinct tubercles but no conspicuous transverse rugae on upper surface.

6. *O. nubigena*.

Scar of nutlet broader and distinctly cuneate at base.

7. *O. Thompsonii*.

Inner surface of nutlets conspicuously rugose or tuberculate.

Scar of nutlet open and cuneate toward the base, only narrowly so in *O. humilis*.

Margin around scar somewhat elevated.

Cymules elongated and inflorescence broad.

Calyx-lobes 10-12 mm. long in fruit; nutlets 4.5 mm. long, prominently carinate on the dorsal side.

8. *O. virginensis*.

Calyx-lobes 5-7 mm. long in fruit; nutlets 2.5-3 mm. long, with only an indistinct central ridge toward the apex.

9. *O. Hoffmannii*.

Cymules short and inflorescence narrow; nutlets without or with only an indistinct central ridge on the dorsal side.

10. *O. tumulosa*.

Margin around the scar not at all elevated; scar with only narrow opening at base.

11. *O. humilis*.

Scar of nutlet closed and linear or nearly so, without conspicuous triangular opening toward the base.

Leaves uniformly strigose on the upper surface and without pustules.

12. *O. propria*.

Leaves with strigose hairs, also with marginal setae pustulate at base.

Nutlets dark brown and glossy, tuberculate, not rugose but with an occasional pair of tubercles connected by a low vein-like ridge.

13. *O. Sheldonii*.

Nutlets more or less rugose, the ridges and tubercles pallid. (See also *O. humilis*.)

Nutlets 3-4 mm. long; stems slender.

14. *O. spiculifera*.

Nutlets 4-5 mm. long; dorsal ridges conspicuously rugose.

15. *O. celosoides*.

Corolla-tube distinctly longer than the calyx in anthesis; scar of nutlet conspicuously open and its margin distinctly elevated.

16. *O. flavoculata*.

1. *Oreocarya abortiva* Greene. Prostrate *Oreocarya*. Fig. 4312.

Oreocarya abortiva Greene, Pittonia 3: 114. 1896.

Krynitzkia multicaulis var. *abortiva* M. E. Jones, Contr. West. Bot. No. 13: 5. 1910.

Oreocarya suffruticosa var. *abortiva* J. F. Macbride, Proc. Amer. Acad. 51: 547. 1916.

Cryptantha Jamesii var. *abortiva* Payson, Ann. Mo. Bot. Gard. 14: 250. 1927.

Hemisphaerocarya abortiva Brand, Rep. Spec. Nov. 24: 61. 1927.

Stems several from the root crown, decumbent or prostrate, 5-15 cm. long, herbage silver-gray throughout with a fine strigulose pubescence and with few hirsute bristles in the inflorescence especially on the margins of the bracts. Leaves mostly tufted near the base, 5-10 cm. long, oblanceolate, densely strigulose and with scattered appressed bristles pustulate at base; raceme short leafy-bracteate, usually in a thyrsoid panicle 1.5-3 cm. long; calyx-lobes ovate-lanceolate, 3-4 mm. long, densely strigose and setose, the tube very short; corolla white, 3-4 mm. long, the limb about 3 mm. broad; nutlets 1-4, narrowly ovoid, 2-2.5 mm. long, curved on the dorsal side, smooth and glossy, ventral side strongly keeled with sloping sides, the keel grooved about two-thirds the way up and forked at base; scar linear, situated in the groove.

Gravelly flats, mountains, mostly Canadian Zone; Mono and Inyo Counties and to the San Bernardino Mountains, California, east to southern Nevada. Type locality: Bear Valley, San Bernardino Mountains, California. May-Aug.

2. *Oreocarya confertiflora* Greene. Mojave *Oreocarya*. Fig. 4313.

Oreocarya confertiflora Greene, Pittonia 3: 112. 1896.

Oreocarya leucophaea var. *confertiflora* Parish, Erythra 7: 95. 1899.

Oreocarya lutea Greene ex Fedde, Rep. Spec. Nov. 19: 72. 1923.

Cryptantha confertiflora Payson, Ann. Mo. Bot. Gard. 14: 256. 1927.

Perennial with a stout woody root and woody caespitose caudex, the flowering stems simple,

1.5–5 dm. high, densely white silky-villous at base, strigose and sparingly setose above, the bristles appressed or ascending. Leaves rather crowded near the base, their clasping bases often persistent, linear-oblancoale, acute, 3–10 cm. long, densely strigose and at least all but the lowest with appressed bristles with pustulate bases, lower surface uniformly strigose; inflorescence usually less than one-third the length of the stem, the axis, floral bracts and calyces covered with spreading yellowish bristles, cymules short; sepals linear-lanceolate, acute, 7–10 mm. long in flower, 10–12 mm. in fruit; corolla pale yellow or cream-colored, 12–14 mm. long, the limb 7–9 mm. broad; nutlets broadly ovoid, sharply 3-angled, about 3 mm. long, flat or concave dorsally, acute and narrowly wing-margined at the angles, glossy and smooth; scar straight extending from base to about the middle, the margin not elevated.

Usually on gravelly benches or washes, Upper Sonoran and Arid Transition Zones; desert regions from Mono and Inyo Counties to the northern base of the San Bernardino Mountains, San Bernardino County, California, east to southern Nevada, southwestern Utah and northern Arizona. Type locality: Cushenberry Springs, desert slopes of the San Bernardino Mountains, California. May–July.

3. *Oreocarya leucophaea* (Dougl.) Greene. Gray *Oreocarya*. Fig. 4314.

Myosotis leucophaea Dougl. ex. Lehm. Stirp. Pug. 2: 22. 1830.

Eritrichium leucophaeum A. DC. Prod. 10: 129. 1846.

Krynitzkia leucophaea A. Gray, Proc. Amer. Acad. 20: 280. 1885.

Oreocarya leucophaea Greene, Pittonia 1: 58. 1887.

Cryptantha leucophaea Payson, Ann. Mo. Bot. Gard. 14: 262. 1927.

Stems arising from a caespitose woody caudex, 2–4 dm. high, densely white-strigose below, bristly-hirsute above. Leaves linear to linear-oblancoale, acute, 3–6 cm. long or rarely longer, ciliate toward the base and on the winged petioles, strigose on both sides; inflorescence 7–15 cm. long, narrow, congested above, leafy bracted below, densely bristly-hirsute; fruiting calyx 10–15 mm. long, the lobes linear-subulate, white-strigose and densely bristly; corolla white, the tube 8–10 mm. long, limb 8–10 mm. broad; nutlets about 3.5 mm. long, smooth and glossy, the margins acute but not winged; scar as in preceding species.

Usually in sandy soils, associated with sagebrush, Arid Transition Zone; east of the Cascade Mountains from southern British Columbia and eastern Washington at least as far as Walla Walla County, and probably adjacent northern Oregon. Type locality: "arid barrens of the Columbia, and of its northern and southern tributaries." May–July.

4. *Oreocarya subretusa* (I. M. Johnston) Abrams. Crater Lake *Oreocarya*. Fig. 4315.

Cryptantha subretusa I. M. Johnston, Journ. Arnold Arb. 20: 393. 1939.

Cryptantha andina I. M. Johnston ex M. E. Peck, Man. Pl. Oregon 601. 1941.

Cespitose perennial, the woody caudex usually compact and densely leafy. Leaves congested at base, spatulate, subretuse, rounded or obtuse at apex, tomentose; stems 7–20 cm. high, densely yellowish hirsute-bristly, flowers mostly congested in a rather narrow thyrsus, bracts densely yellowish-hispid, the lower longer than the cymes, the upper shorter; sepals 3–4 mm. long in anthesis, 5–7 mm. in age; corolla white, tube 3–4 mm. long, limb 3–6 mm. broad; nutlets oblong-lanceolate, 3–4 mm. long, acute on the angles or narrowly wing-margined, dorsal surface convex, inconspicuously tuberculate or with short low rugae; scar linear or subulate with the base slightly open.

Dry talus slopes, especially in pumice, Boreal Zones; Crater Lake, Oregon to Mount Eddy, Siskiyou County, California, east to Wallowa and Harney Counties, Oregon, and Humboldt County, Nevada. Type locality: "Crater Lake, pumice slope on rim, 7,000 ft." May–Aug.

This species has been confused by some authors with *O. nubigena* and *O. humilis*.

5. *Oreocarya crymophila* (I. M. Johnston) Jepson & Hoover. Alpine *Oreocarya*. Fig. 4316.

Cryptantha crymophila I. M. Johnston, Journ. Arnold Arb. 21: 65. 1940.

Oreocarya crymophila Jepson & Hoover in Jepson, Fl. Calif. 3: 328. 1943.

Perennial, stems erect, several, 1.5–3 dm. high, simple, hirsute and minutely villous below, hispid above. Leaves grayish villous-tomentose and bearing upwardly appressed setae on both surfaces, the setae on the lower surface pustulate at base; lower leaves spatulate-oblancoale, 5–10 cm. long; upper cauline leaves oblancoale or narrowly linear, 4–5 cm. long, 4–5 mm. broad; cymes 3–7-flowered, scattered in the axils of the leaves and glomerate at the apex, fruiting inflorescence 2–3 cm. broad; calyx 5 mm. long in flower, 13–15 mm. in fruit; corolla white, 8 mm. long, limb 5 mm. broad; nutlets 4, ovoid, 4.5–5 mm. long, rounded at base, dorsal side irregularly rugose, the rugae interrupted more or less by transverse rugae, ventral side smooth; scar narrow, subulate at base; gynobase subulate.

Rocky slopes, mainly Hudsonian Zone; alpine ridges between the Clark Fork and Middle Fork of the Stanislaus River, Sierra Nevada, Alpine and Tuolumne Counties, California. Type locality: Red Peak, Alpine County, California. July–Aug.

6. *Oreocarya nubigena* Greene. Sierra *Oreocarya*. Fig. 4317.

Oreocarya nubigena Greene, Pittonia 3: 112. 1896.

Cryptantha nubigena Payson, Ann. Mo. Bot. Gard. 14: 265, in part. 1927.

Cryptantha Clemensiae Payson, op. cit. 14: 267.

Stems several to many from rather slender roots, slender, 6–15 cm. high, densely leafy at

base, retrorsely pubescent and setose with spreading bristles. Leaves narrowly oblanceolate or spatulate, 2-3 cm. long, rather thinly hirsute-pubescent and setose with mostly ascending bristles, mostly pustulate on both surfaces; inflorescence short-spicate, often with a few scattered cymules below in the axils of leafy bracts; sepals 3-4 mm. long in flower, about 7 mm. in fruit, setose with slender bristles; corolla white, tube barely 3 mm. long, shorter than the sepals in anthesis, limb 4 mm. broad; nutlets narrowly lanceolate, 3 mm. long, narrowly wing-margined, slightly glossy, dorsal side tuberculate, the tubercles sometimes forming short rugae, ventral surface nearly smooth; scar straight, extending from near the base nearly to the apex, narrow but open, the margin not elevated.

Rocky or sandy slopes and moraines, Arctic-Alpine and Hudsonian Zones; high Sierra Nevada from Mount Conness, Mono County to Mount Whitney, Inyo County, California. Type locality: Cloud's Rest, Yosemite National Park. July-Aug.

7. *Oreocarya Thompsonii* (I. M. Johnston) Abrams. Thompson's *Oreocarya*.
Fig. 4318.

Cryptantha Thompsonii I. M. Johnston, Contr. Arnold Arb. No. 3: 88. 1932.

Cespitose perennial, with a stout woody root and stout-branched woody caudex or root crown, stems 1 to several, 15-25 cm. high, densely bristly-hirsute with slender weak bristles. Basal leaves oblanceolate to spatulate, acutish to rounded at apex, 5-7 cm. long, grayish-tomentose and bearing scattered appressed bristles on both sides; cymules crowded at the apex, scattered below in the axils of the much longer linear or linear-lanceolate foliaceous bracts, loosely and irregularly few-flowered, not scorpioid; sepals about as long as corolla-tube in flower, 8-12 mm. long in fruit, densely setose; corolla white, tube 3-4 mm. long, limb 3-7 mm. broad; nutlets ovate or oblong-ovate, short-acuminate, glossy, dorsal side irregularly rugose and tuberculate, inner surface smooth; scar open and cuneate at base.

Rocky ground, especially talus slopes, Canadian and Arid Transition Zones; east side of the Cascade Mountains in Chelan and Kittitas Counties, Washington. Type locality: "rocky open crest of Iron Mts., Mt. Stuart region, Kittitas Co., 7000 ft." June-Aug.

8. *Oreocarya virginensis* (M. E. Jones) J. F. Macbride. Virgin Valley *Oreocarya*. Fig. 4319.

Krynitzkia glomerata var. *virginensis* M. E. Jones, Contr. West. Bot. No. 13: 5. 1910.

Oreocarya virginensis J. F. Macbride, Proc. Amer. Acad. 51: 547. 1916.

Biennial or short-lived perennial, from a somewhat woody taproot; stems 1 to many from the root crown, stout, 1.5-4 dm. high, conspicuously hispid with divaricate bristles. Leaves oblanceolate to spatulate, rounded or obtuse at apex, 5-10 cm. long, setose-bristly on the margins and petioles, the bristles few, somewhat appressed and usually conspicuously pustulate especially on the lower surface of the leaves; flowers in a large thyrsus extending well below the middle of the stem; individual cymes elongated; bracts foliaceous and conspicuous; calyx-lobes lanceolate in anthesis, 4 mm. long, becoming 10-12 mm. long and linear in fruit, setose, the bristles often somewhat fulvous; corolla white, tube 3-4 mm. long, about equaling the calyx, limb 6-8 mm. broad; nutlets usually only 1 or 2 maturing, lanceolate-ovate, obtuse, 4.5 mm. long, dorsal surface distinctly carinate, and both it and the ventral surface somewhat rugose and tuberculate; scar narrowly triangular.

Rocky hills, Upper Transition Zone; Mojave Desert region: Panamint Mountains, hills north of Barstow, Kingston Mountains, California; also Charleston Mountains, Nevada, east to south Utah. Type locality: La Verkin, Virgin River Valley, Utah. March-June.

9. *Oreocarya Hoffmannii* (I. M. Johnston) Abrams. Hoffmann's *Oreocarya*.
Fig. 4320.

Cryptantha Hoffmannii I. M. Johnston, Contr. Arnold Arb. No. 3: 90. 1932.

Stems 1 to several from a biennial or short-lived perennial root, erect, 15-30 cm. high, conspicuously hirsute and retrorsely pubescent. Basal leaves spatulate, 2-4 cm. long, the blade 5-10 mm. broad, tapering or abruptly narrowed to a petiole much longer than the blade, retrorsely hirsutulous, also sparsely bristly, bristles pustulate at base, more or less appressed; stem-leaves distant, the lower with winged petioles, the upper reduced, linear and sessile; inflorescence 6-18 cm. long, 3.5-6 cm. broad, more or less interrupted; cymules ascending, 2.5-4 cm. long; calyx-lobes 3-3.5 mm. long, equaling the corolla-tube, in fruit 5-7 mm. long, narrowly lanceolate, hirsutulous and rather densely bristly, the hairs yellowish; corolla white, tube 3 mm. long, limb 5-6 mm. broad; nutlets ovate, 2.5-3 mm. long, acute, dorsal surface tuberculate and slightly rugose; ventral surface with scar open, extending nearly to the apex, the sides rugose.

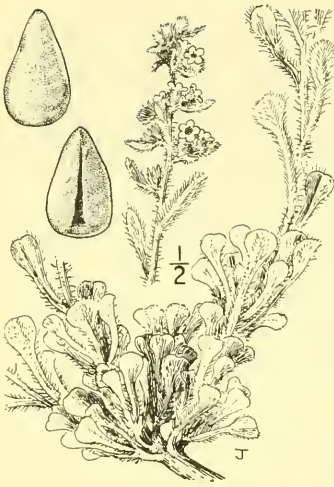
Mountain slopes, Arid Transition Zone; southern Sierra Nevada and White Mountains, Inyo County, California. Type locality: rocky open slope, Westgard Pass, 7,300 feet altitude, northern Inyo County, California. June-July.

10. *Oreocarya tumulosa* Payson. Mojave *Oreocarya*. Fig. 4321.

Oreocarya tumulosa Payson, Univ. Wyo. Pub. Sci. 1: 164. 1926.

Cryptantha tumulosa Payson, Ann. Mo. Bot. Gard. 14: 276. 1927.

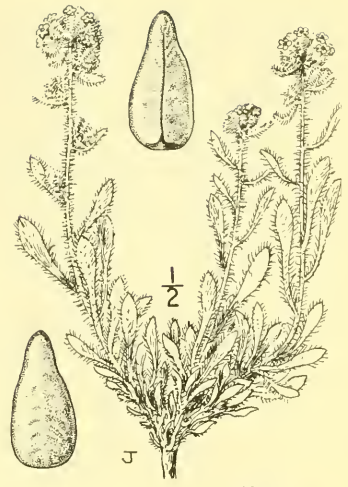
Cespitose perennial with a stout woody root; stems few to many from a branched caudex, 7-25 cm. high, short-villous and setose with divaricate bristles. Leaves crowded near the base,



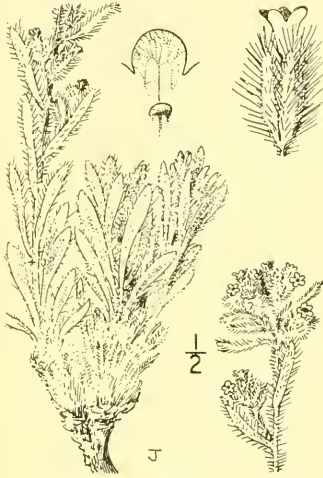
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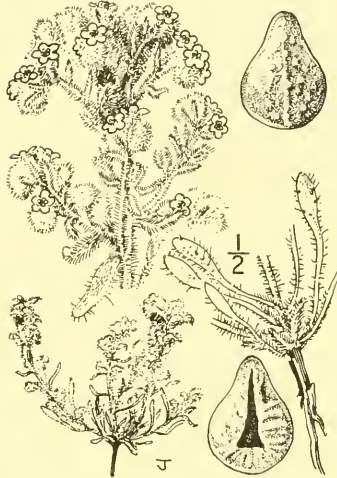
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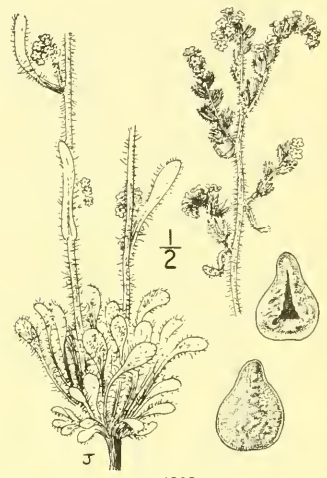
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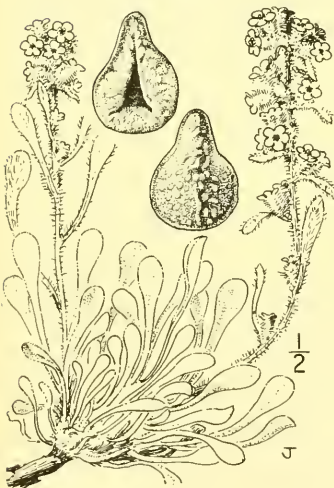
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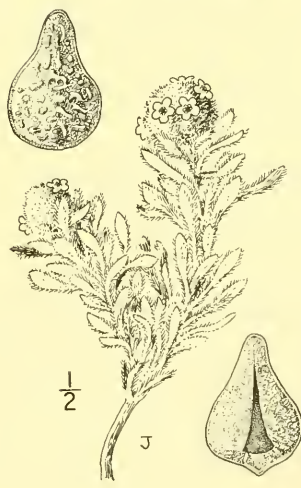
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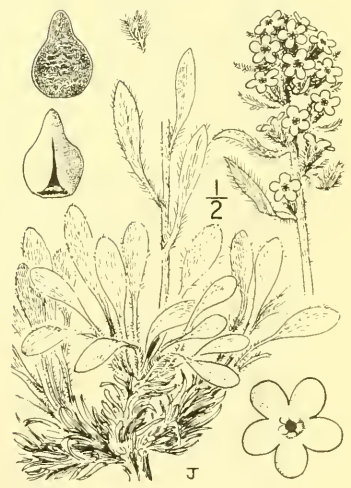
4320



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4315. *Oreocarya subretusa*
 4316. *Oreocarya crymophila*
 4317. *Oreocarya nubigena*

4318. *Oreocarya Thompsonii*
 4319. *Oreocarya virginensis*
 4320. *Oreocarya Hoffmannii*

4321. *Oreocarya tumulosa*
 4322. *Oreocarya humilis*
 4323. *Oreocarya propria*

oblanceolate or spatulate, obtuse or rounded at apex, 3–5 cm. long, gradually narrowed to a long petiole, whitish-tomentulose and with few slender more or less appressed bristles; inflorescence rather narrow, interrupted only below, the cymes short; lowest bracts foliaceous, the upper inconspicuous, becoming reflexed, conspicuously setose with spreading or retrorse yellowish bristles; sepals in anthesis linear-lanceolate, about 4 mm. long, 8–10 mm. in fruit, densely setose-spreading with retrorse bristles; corolla white, tube 3.5–4 mm. long, limb 7 mm. broad; nutlets only 1 or 2 maturing, ovate-lanceolate in outline, 4 mm. long, obtuse and light-colored, dull or only slightly glossy, margin acute, dorsal surface with a low medial ridge, tuberculate and distinctly rugose; scar triangular, short, open.

Gravelly slopes, Upper Sonoran Zone; Providence, New York, Panamint and Ivanpah Ranges in the Mojave Desert, California; Charleston Mountains, Nevada. Type locality: Providence Mountains, California. April–June.

11. *Oreocarya humilis* (A. Gray) Greene. Low *Oreocarya*. Fig. 4322.

Eritrichium glomeratum var. *humile* A. Gray, Proc. Amer. Acad. 10: 61, in part. 1874.

Oreocarya humilis Greene, Pittonia 3: 112. 1896.

Cryptantha humilis Payson, Ann. Mo. Bot. Gard. 14: 278. 1927.

Cespitose perennial, stems 1 to several from a compact short-branched, densely leafy, woody caudex, 5–20 cm. high, hirsute with weak spreading bristles. Leaves densely tufted at base, oblanceolate to broadly spatulate, narrowed to a rather slender petiole, 2–4 cm. long, densely silky-tomentose, and with scattering slender bristles; sepals linear or linear-lanceolate, acute, 4–5 mm. long in anthesis, 8–13 mm. in fruit; corolla white, tube 4–5 mm. long, limb 8–10 mm. broad; nutlets commonly 4 maturing, ovate-lanceolate in outline, acute or obtuse, 3–4.5 mm. long, margins acute, dorsal surface somewhat glossy, densely and finely tuberculate, or the tubercles sometimes united to form short rugae, ventral surface rather indistinctly tuberculate, scar triangular, open at the base or nearly closed.

Alpine ridges, Canadian and Hudsonian Zones; Sierra Nevada, from Nevada County to Mono County, California, east to Malheur County, Oregon, and western Nevada. Type locality: Summit Station (Donner Pass), Nevada County, California, as designated by I. M. Johnston, Contr. Arnold Arb. 3: 87. 1932. June–Aug.

12. *Oreocarya propria* Nels. & Macbr. Malheur *Oreocarya*. Fig. 4323.

Krynitzkia fulvocanescens var. *idahoensis* M. E. Jones, Contr. West. Bot. No. 13: 6. 1910.

Oreocarya propria Nels. & Macbr. Bot. Gaz. 62: 145. 1916.

Cryptantha propria Payson, Ann. Mo. Bot. Gard. 14: 317. 1927.

Cespitose perennial with a woody caudex, densely clothed with the old leaf-bases, stems few to many, 15–25 cm. high, rather slender, sparsely setose. Leaves clustered on the crown of the caudex branches, spatulate, obtuse, 4–8 cm. long, finely strigose and appressed-setulose and on the upper side with pustulate bristles, the lower side densely and finely strigose with a few intermingling pustulate hairs; petioles ciliate near the base with long white hairs; inflorescence rather narrow, little or not at all interrupted, extending to the middle of the stem or a little below, densely but weakly setose and hirsute; sepals in fruit 8–10 mm. long; corolla white, the tube 3–5 mm. long, about equaled by the lobes; nutlets lanceolate, 3–4 mm. long, acute on the margins, dull, dorsal side densely rugulose with somewhat minute narrow ridges, conspicuously muricate near the margins; scar narrow, slightly open, extending nearly to the apex, not elevated on the margins.

Dry hillsides, Upper Sonoran Zone; Malheur County, southwestern Oregon to western Idaho. Type locality: near Harper Ranch, Malheur County, Oregon. May–July.

13. *Oreocarya Sheldonii* Brand. Sheldon's *Oreocarya*. Fig. 4324.

Oreocarya Sheldonii Brand, Rep. Spec. Nov. 19: 73. 1923.

Cryptantha Sheldonii Payson, Ann. Mo. Bot. Gard. 14: 301. 1927.

Perennial with stout root; stems usually several from a branched root crown, stout, 15–25 cm. high, simple, or with 1 or more slender ascending branches from near the base, hirsute-hispid with spreading setae and with a fine somewhat tomentose pubescence of reflexed hairs, densely leafy at base. Leaves, especially the lower, spatulate, 2–3 cm. long, 5–7 mm. broad near the rounded apex, canescent with a more or less appressed pubescence, the upper surface and margins also with scattered ascending slender setae with pustulate bases; upper stem-leaves gradually reduced, oblanceolate to narrowly linear-oblanceolate; cymes several-flowered, in fruit 1–2 cm. long, crowded into a rather dense terminal spike-like inflorescence, 6–10 cm. long, or on some of the slender basal branches sometimes smaller; fruiting calyx-lobes 5–10 mm. long, narrowly linear-lanceolate, bristly with spreading setae; corolla white, 5–6 mm. long, limb 5 mm. broad; nutlets ovate-lanceolate, subacute at apex, 3 mm. long, the margin sharply acute, dorsal side brownish, somewhat glossy, tuberculate, some of the tubercles connected by slender ridges to form a few rather inconspicuous rugae.

Dry rocky slopes and ridges, Arid Transition Zone; Spokane River Valley, eastern Washington to Kootenai and Coeur d'Alene, northern Idaho; also Wallowa County, eastern Oregon. Type locality: Deep Creek, Wallowa County, Oregon. May–July.

14. *Oreocarya spiculífera* Piper. Bristly Oreocarya. Fig. 4325.

Oreocarya spiculífera Piper, Contr. U.S. Nat. Herb. 11: 481. 1906.

Oreocarya cilio-hirsuta Nels. & Macbr. Bot. Gaz. 55: 378. 1913.

Cryptantha spiculífera Payson, Ann. Mo. Bot. Gard. 14: 298. 1927.

Cespitose with a stout woody caudex bearing 1 to several short tufted branches, the herbage pallid. Basal leaves numerous and crowded, spatulate-ob lanceolate, mostly acute, the blades 1.5–2 cm. long, about equaling the margined petioles, densely and finely pubescent on both sides with soft reflexed hairs, also with scattered spreading bristles on both sides and the margins; stem-leaves similar but with shorter petioles; flowering stems simple, erect, 2–3 dm. high, pubescent like the leaves; inflorescence of 8–12 ascending racemes, floriferous throughout or nearly so; bracts linear-lanceolate, shorter than the calyx; pedicels short; calyx-lobes erect, narrowly lanceolate, 6–8 mm. long, pubescent like the leaves but more bristly; corolla white, tube 5 mm. long, limb 8 mm. broad, appendages short, triangular-ovate; nutlets ovoid, 3 mm. long, pale brown, dull, smooth on the narrow margin, bluntly tuberculate on the dorsal side, rugose on the ventral, the groove reaching to the apex; gynobase longer than the nutlet.

Dry hillsides or benches, Arid Transition Zone; eastern Washington to southwestern Idaho. Type locality: "Ritzville [1,600 feet altitude], Adams County," Washington. May–June.

15. *Oreocarya celosioides* Eastw. Cockscomb Oreocarya. Fig. 4326.

Oreocarya celosioides Eastw. Bull. Torrey Club 30: 240. 1903.

Cryptantha celosioides Payson, Ann. Mo. Bot. Gard. 14: 299. 1927.

Perennial from a stout, woody root; branches of the caudex densely clothed with the broad imbricated petioles of old leaves; stems 1 to several, stout, 2–4 dm. high, densely setose with spreading bristles. Basal leaves crowded, spatulate to oblanceolate, usually obtuse, 2–5 cm. long, densely and finely white-tomentose on both sides, also setose with slender appressed bristles; cauline leaves less tomentose and thickly beset by bristles with more or less prominent pustulate bases; inflorescence usually extending to the middle of the stem or below, often rather narrow and dense, densely setose-bristly; bracts foliaceous, lanceolate-linear, shorter than the mature cymules; sepals densely bristly, 5 mm. long in flower, linear-lanceolate and 10–12 mm. long in fruit; corolla white, tube 4–5 mm. long, and equaling the sepals, limb about 8 mm. broad; nutlets 2–4 maturing, ovate-lanceolate, very acute or narrowly margined on the angles; dorsal surface dull or slightly glossy, conspicuously rugose and toward the edges somewhat muriculate; scar closed, extending from the base to near the apex.

Dry slopes and plains, Upper Sonoran and Arid Transition Zones; Columbia River Basin, from Okanagon and Lincoln Counties, Washington, to Wasco and Baker Counties, Oregon. Type locality: "bank of the Columbia River, eastern Washington." May–July.

16. *Oreocarya flavoculàta* A. Nels. Yellow-eyed Oreocarya. Fig. 4327.

Oreocarya flavoculata A. Nels. Erythea 7: 66. 1899.

Oreocarya Shockleyi Eastw. Bull. Torrey Club 30: 245. 1903.

Cryptantha flavoculata Payson, Ann. Mo. Bot. Gard. 14: 334. 1927.

Perennial with cespitose, woody caudex; stems 1 to many, rather slender, 1–3 dm. high, pubescent with retrorsely appressed hairs and hispid with slender, spreading bristles. Lower leaves linear-ob lanceolate to spatulate-obtuse or sometimes acute, 3–8 cm. long, appressed-silky-pubescent on both sides with scattering appressed bristles interspersed, upper stem-leaves less appressed-pubescent, and more bristly, the bristles, especially on the margins, spreading; inflorescence a rather narrow spicate-thyrsum, with the upper cymules crowded, the lower scattered; floral bracts linear-lanceolate, at least the lower longer than the cymules; sepals densely bristly with usually yellowish bristles, linear-lanceolate, 4–5 mm. long in anthesis, 10–12 mm. in fruit; corolla white or pale yellow, crests in the throat yellow, tube slender, 7–10 mm. long, limb 7–8 mm. broad; nutlets ovate to lanceolate in outline, usually obtuse at apex, the margin at the angles acutish, dorsal surface somewhat glossy, tuberculate, muriculate and more or less rugose; scar open and conspicuous, surrounded by a high elevated margin.

Rocky hillsides, often associated with sagebrush or junipers, Upper Sonoran and Arid Transition Zones; a Great Basin species, extending from western Colorado and Wyoming to central and southern Nevada, reaching southeastern California where it is found in the Inyo and Panamint Mountains. Type locality: Piedmont, Wyoming. May–July.

23. *AMSÍNCKIA* Lehm. Del. Sem. Hort. Hamb. 7. 1831.

Hispid or setose annual herbs with erect or spreading, branched stems, alternate linear or lanceolate leaves and yellow flowers in elongated scorpioid spikes. Calyx deeply 5-parted or rarely appearing 4-parted by the union of 2 into 1 broader one. Corolla yellow or orange, funnelform or salverform, the throat open and without crests or processes, sometimes constricted and more or less closed by sac-like processes. Stamens inserted in the throat or in the tube, irregularly or in one plane. Style filiform; stigma capitate, 2-lobed. Nutlets crustaceous, erect or incurved, smooth or rough, triquetrous or ovate-triangular. Cotyledons deeply 2-parted. [Name in honor of William Amsinck, a patron of the Hamburg Botanic Garden.]

A genus of about 20 species natives of western North America and southern South America. Type species, *Amsinckia lycopsoides* Lehm.

The natural limits of the specific entities of *Amsinckia* are not obvious and a satisfactory systematic treat-

ment must await cytogenetic and cultural studies. Suksdorf (Werdenda 1: 47-113. 1931.) described over 200 new species of *Amsinckia*, basing many of them on a single collection, and upon characters of doubtful significance, for they seem too variable and unstable in this genus.

Corolla-tube 20-nerved below attachment of stamens; calyx-lobes unequal in width and reduced in numbers (2, 3 or 4) by fusion.

Nutlets tessellate and dull; scar median, ovate.

Corolla-limb 6-8 mm. broad; calyx densely rusty-pubescent and bristly.

1. *A. Douglasiana*.

Corolla-limb 2-4 mm. broad; calyx thinly whitish-hirsute.

2. *A. tessellata*.

Nutlets smooth and shining.

Scar of nutlet conspicuous, nearly median, ovate-lanceolate.

3. *A. grandiflora*.

Scar of nutlet not developed; ventral angle bearing a closed lineate groove.

4. *A. vernicosa*.

Corolla-tube 10-nerved below insertion of stamens; calyx-lobes 5, distinct, or the two axial united near the base in *spectabilis*.

Leaves mostly erose-dentate; nutlets black or dark brown, small, 1.5-2 mm. long; corolla funnelform, throat open; coastal species.

Corolla 3-5 mm. long.

5. *A. Scouleri*.

Corolla 7-16 mm. long.

6. *A. spectabilis*.

Leaves entire; nutlets brownish or grayish not black, longer, mostly 2.5-3.5 mm. long; species not maritime.

Corolla funnelform, at least narrowly so, with the throat open and glabrous; stamens inserted, usually more or less irregularly, in the corolla-throat.

Corolla orange-yellow, 7-20 mm. long, well-exserted beyond the calyx; plants usually green; stems hirsute-bristly, but with little or no fine-appressed hairs.

7. *A. intermedia*.

Corolla pale yellow, 4-7 mm. long, little or not at all exserted beyond the calyx-lobes.

Corolla-limb 2-3 mm. broad; anthers unevenly placed in the throat; nutlets usually with transverse rugae between the keel and lateral angles; leaves pubescent with appressed or ascending hairs.

8. *A. retrorsa*.

Corolla-limb about 1 mm. broad; nutlets uniformly muricate between the keel and lateral angles but without transverse rugae; leaves and stems rather sparsely clothed with long spreading bristly hairs.

9. *A. micrantha*.

Corolla more or less salverform, the throat constricted and closed or nearly so by intruding hairy saccate processes; stamens inserted evenly in one plane on the tube well below the constriction.

10. *A. lycopsoides*.

1. *Amsinckia Douglasiana* A. DC. Douglas' *Amsinckia* or Fiddle-neck.

Fig. 4328.

Amsinckia Douglasiana A. DC. Prod. 10: 118. 1846.

Amsinckia Lemmonii J. F. Macbride, Contr. Gray Herb. No. 48: 50. 1916.

Amsinckia macrantha Suksd. Werdenda 1: 102. 1931.

Amsinckia gloriosa Eastw. ex Suksd. op. cit. 103.

Amsinckia Munzii Suksd. loc. cit.

Stems erect, 3-6 dm. high, simple up to the inflorescence, or sometimes branched below, thinly bristly below with more or less appressed bristles, more abundantly so above and the bristles spreading. Leaves linear-lanceolate or the uppermost lanceolate, lowest narrowed to a winged petiole, the others sessile, appressed-hirsute and somewhat cinereous, pustules of the pubescence inconspicuous or wanting, especially in the upper leaves; spikes dense and subcapitate when young, 10-15 cm. long in age, the bristles and pubescence rusty colored, especially on the calyx; calyx-lobes 3-4, the outer one often 3-4 mm. broad, entire or sometimes notched at apex; corolla orange-yellow, tube 10-12 mm. long, limb 6-10 mm. broad; nutlets broadly ovoid, 4 mm. long, the back rather flat with a low or almost obsolete central keel, more or less rugosely wrinkled and densely tessellate, not scabrous or muricate, sometimes denticulate on the lateral angles; scar ovate, median.

Rolling open hills and valleys, Upper Sonoran Zone; South Coast Ranges, San Benito County, and Salinas Valley, Monterey County, to northern Santa Barbara County and western Kern County. Type locality: California. Collected by Douglas. March-May.

2. *Amsinckia tessellata* A. Gray. Tessellate Fiddle-neck. Fig. 4329.

Amsinckia tessellata A. Gray, Proc. Amer. Acad. 10: 54. 1874.

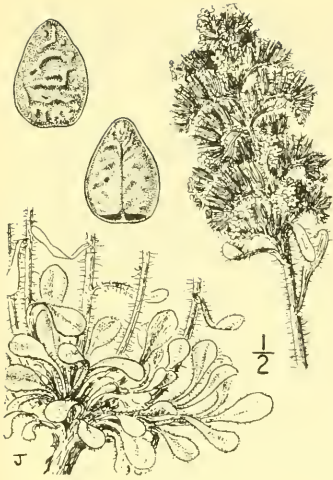
Amsinckia collina Greene, Man. Bay Reg. 263. 1894.

Amsinckia pustulata Heller, Muhlenbergia 2: 243. 1906.

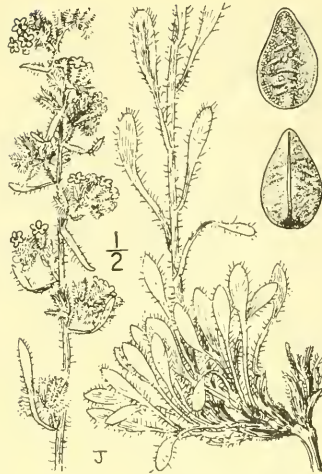
Amsinckia conica Suksd. Werdenda 1: 104. 1931. In the same publication 15 other species referable to *tessellata* were described.

Stems stout, branched throughout or sometimes simple below, 3-6 dm. high, hispid with spreading bristles. Leaves linear-lanceolate to ovate-lanceolate, 2-7 cm. long, rather thinly hispid, the hairs pustulate at base, sessile except the narrowly oblanceolate basal ones; spikes elongating with age, often 5-12 cm. long; calyx-lobes 3 or 4, when 4 one broader and notched or 2-lobed at apex, when 3 two a little broader and notched at apex, hispid and in the margins densely white-hirsute, 8-13 mm. long; corolla orange, tube 5-10 mm. long, limb 2.5-5 mm. broad; nutlets 3-3.5 mm. long, ovoid, the back low, usually with a median line, densely tessellate or papillate, and often transversely rugose.

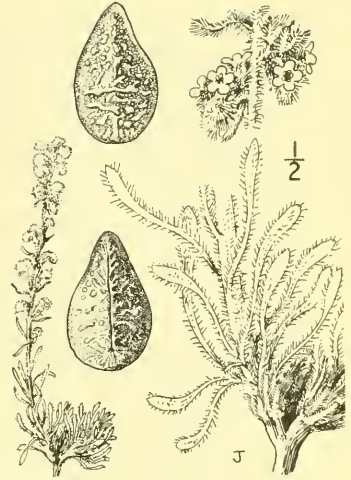
Dry, usually sandy or rocky soils, Upper and Lower Sonoran Zones; Douglas County, eastern Washington, southeast of the Cascades and the Sierra Nevada to Nevada and Arizona and the desert regions of California, where it also occurs west of the Sierra Nevada in the San Joaquin Valley and the Inner Coast Ranges, from Contra Costa County southward to San Diego County, and northern Lower California. Type locality: near Mount Diablo, California. March-June.



4324



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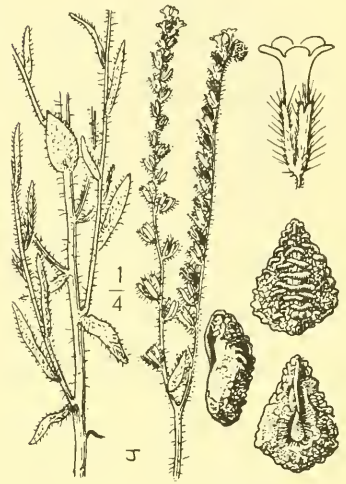
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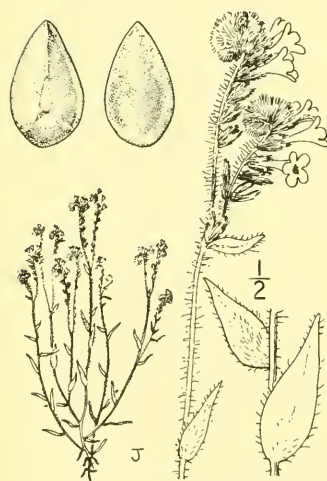
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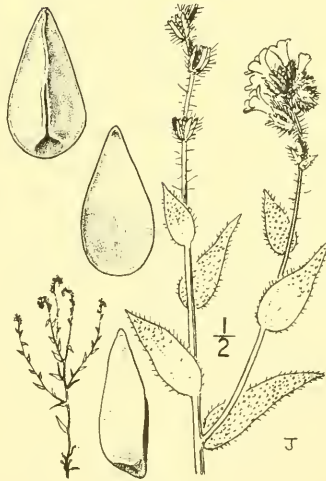
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4330



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4324. *Oreocarya* *Sheldonii*
4325. *Oreocarya* *spiculifera*
4326. *Oreocarya* *celosioides*

4327. *Oreocarya* *flavoculata*
4328. *Amsinckia* *Douglasiana*
4329. *Amsinckia* *tessellata*

4330. *Amsinckia* *grandiflora*
4331. *Amsinckia* *vernicosa*
4332. *Amsinckia* *Scouleri*

3. *Amsinckia grandiflora* Kleebl. Large-flowered Fiddle-neck. Fig. 4330.

Amsinckia grandiflora Kleebl. ex A. Gray, Bot. Calif. 1: 525, as a synonym. 1876.

Amsinckia vernicosa var. *grandiflora* A. Gray, loc. cit.

Amsinckia grandiflora Kleebl. ex Suksd. Werdenda 1: 113. 1931.

Stems erect, 3–5 dm. high, branching a few inches above the base or often above the middle, sparingly hispid below, thinly pilose above and the hispid hairs weak or represented only by their pustulate bases. Leaves sessile, the lower linear-lanceolate, the upper lanceolate to broadly so, attenuate at apex, rather densely pustulate on both surfaces, but the bristles rather weak or not developed from some pustules; spikes dense at first, becoming 10–15 cm. long in age; calyx-lobes 3–4, covered with rusty-colored bristles, more or less concealing the appressed hairs beneath; corolla orange, tube 12–15 mm. long, the limb 8–10 mm. broad; nutlets ovoid-lanceolate, smooth and shining, plane on the back and sides, lateral angles sharp and carinate; scar ovate-lanceolate, seated a little below the middle.

Open grasslands, Upper Sonoran Zone; Inner Coast Ranges in Contra Costa and Alameda Counties. Type locality: Antioch, Contra Costa County. At the original locality, this species seems to have been exterminated, and the same seems to be true of other localities in Livermore Valley, but in 1938 R. F. Hoover rediscovered this very distinct species in Corral Hollow, western San Joaquin County. March–May.

4. *Amsinckia vernicosa* Hook. & Arn. Green or Vernal Fiddle-neck. Fig. 4331.

Amsinckia vernicosa Hook. & Arn. Bot. Beechey 370. 1838.

Amsinckia carnosus M. E. Jones, Contr. West. Bot. No. 8: 35. 1898.

Amsinckia glauca Suksd. Werdenda 1: 113. 1931.

Stem erect, simple or with few branches above, sometimes branched at the base, 2–6 dm. high, glabrous and glaucous, or sometimes with scattering bristles above. Leaves glabrous and glaucous-green, smooth beneath, more or less prominently pustulate above, the pustules sometimes producing a short mucro, especially those near the tip of the leaf, often ciliate bristly on the margins, lower 4–8 cm. long, linear-lanceolate, narrowed below to a winged petiole, the upper ovate-lanceolate and clasping, all acute or acuminate at apex; spikes 3–12 cm. long; calyx-lobes narrowly lanceolate and 1–1.5 cm. long in fruit, sometimes 2 or more partly united, densely appressed-hirsute and with intermingling stiff spreading bristles; corolla 10–12 mm. long, limb 3–6 mm. wide; nutlets gray, smooth and shining, 4–6 mm. long, plane on the back and lateral surfaces, lateral angles sharp and carinate, scar very narrow.

Dry plains and hillsides, Upper and Lower Sonoran Zones; California Coast Ranges, especially the inner range and the east side of the outer, from Monterey and western Fresno Counties, and western slopes of the Sierra Nevada, Greenhorn Mountains, Kern County, south to central Mojave Desert. Type locality: California. Collected by Douglas, probably on his trip from Monterey to Santa Barbara. March–May.

Amsinckia vernicosa var. *furcata* (Suksd.) Hoover in Jepson, Fl. Calif. 3: 319. 1943. (*Amsinckia furcata* Suksd. Werdenda 1: 113. 1931.) Herbage much like the species but usually more robust and more frequently bearing scattered bristles; calyx-lobes often 10–12 mm. long; corolla orange, 12–18 mm. long, the limb 8–14 mm. broad. Western edge of the San Joaquin Valley and eastern slopes of the Inner Coast Ranges, western Fresno County to southeastern San Luis Obispo County, California. Type locality: White Hills, Cuyama Valley, San Luis Obispo County.

5. *Amsinckia Scouleri* I. M. Johnston. Scouler's Fiddle-neck. Fig. 4332.

Amsinckia lycopsoides of authors, not Lehm. Del. Sem. Hort. Hamb. 1831: 1 and 7. 1831.

Lithospermum lycopsoides Lehm. Stirp. Pug. 2: 28. 1830, and in Hook. Fl. Bor. Amer. 2: 89. 1840.

Amsinckia Scouleri I. M. Johnston, Journ. Arnold Arb. 16: 202. 1935.

Stems 3–6 dm. long, decumbent, sparsely bristly. Leaves ovate to lanceolate, somewhat denticulate, sparsely bristly, the bristles spreading, pustulate at base; spike becoming elongated and the fruiting calyces becoming distant; calyx-lobes oblong or ovate, obtuse, 2 or 3 of them united together and then often notched at apex; corolla yellow-orange, 3–5 mm. long, the throat glabrous; nutlets dark-colored, rugose.

Seashore, in sand or near-by fields, Humid Transition Zone; Alaska south to Tillamook Bay, Oregon. Type locality: "Straits of de Fuca, N.W. America." Collected by Scouler. May–July.

6. *Amsinckia spectabilis* Fisch. & Mey. Seaside Amsinckia. Fig. 4333.

Amsinckia spectabilis Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 2 and 26. 1836.

Amsinckia maritima Eastw. Proc. Calif. Acad. III. 1: 110. 1898.

Amsinckia nigricans Brand, Rep. Spec. Nov. 20: 319. 1924.

Stems erect, 3–6 dm. high, often branched at base, the branches spreading or decumbent, sparsely hispid, the hairs spreading from pustulate bases. Leaves linear-lanceolate to broadly lanceolate, bright green, rather sparsely appressed-hispid above, the hispid hairs on the under surfaces pustulate at base; spikes at length loose, 8–10 cm. long; calyx-lobes 5, with 2 or 3 of them usually partly united, narrowly linear-lanceolate, 4–6 mm. long, hispid and pilose with usually fulvous hairs; corolla orange-colored, usually 8–10 mm. long, the throat glabrous; anthers unequally inserted in the throat, rugose, wrinkled and more or less reticulate, dark-colored, barely 2 mm. long; scar ovate, submedian.

Sandy beaches and dunes along the seashore, Upper Sonoran and Humid Transition Zones; Tillamook Bay, Oregon, to San Diego, California. Type locality: Bodega Bay, California. March–July.

Amsinckia spectabilis var. *nicolai* (Jepson) I. M. Johnston ex Munz, Man. S. Calif. 423. 1935. (*Amsinckia intermedia* var. *nicolai* Jepson, Man. Fl. Pl. Calif. 844. 1925; *A. st.-nicolai* Eastw. Proc. Calif. Acad. III. 1: 109. 1898.) Spikes bracted throughout. San Nicolas, San Miguel and San Clemente Islands, southern California. Type locality: "seashore sands and dry cliffs at 1000 ft. elevation."

Amsinckia spectabilis var. *microcarpa* (Greene) Jepson & Hoover in Jepson, Fl. Calif. 3: 326. 1943.

(*Amsinckia microcarpa* Greene, *Erythea* 2: 191. 1894; *Benthamia microcarpa* Druce, Rep. Bot. Exch. Club British Isles 4: 299. 1916; *Amsinckia dentata* Suksd. *Werdenda* 1: 95. 1931; *A. ochroleuca* Suksd. loc. cit.) Calyx-lobes all distinct to the base or only obscurely united, their bristles brown or blackish; corolla 12–18 mm. long; nutlets densely muriculate but without rugae, or dorsal ridges. Sandy soils near the coast from Pismo, San Luis Obispo County, to the Purisima Hills, Santa Barbara County, California. Type locality: "Plant collected long ago by Dr. Coulter, probably in the southern part of California, but possibly in Mexico."

7. *Amsinckia intermedia* Fisch. & Mey. Common Fiddle-neck or Ranchers Fireweed. Fig. 4334.

Amsinckia intermedia Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 2 and 26. 1836.

Amsinckia campestris Greene, Man. Bay Reg. 263. 1894.

Amsinckia valens J. F. Macbride, Contr. Gray Herb. No. 49: 14. 1917.

Amsinckia intactilis J. F. Macbride, op. cit. 13.

Amsinckia arvensis Suksd. *Werdenda* 1: 32. 1927.

Stems varying from simple or nearly simple and strictly erect to widely branched, 3–9 dm. high, sparsely bristly otherwise usually glabrous except for a tomentose pubescence near the base of the spikes. Basal and lower cauline leaves linear or linear-lanceolate, the upper lanceolate to broadly so, usually clasping at base and acute at apex, thinly hirsute on both sides with spreading, often pustulate hairs; spikes short or usually elongated in fruit, usually leafy-bracted at base; calyx-lobes linear-attenuate, about half as long as the corolla, rufous-hispid on the back, densely white-hirsute on the margins; corolla orange-yellow, 8–10 mm. long, the limb 3–6 mm. wide; nutlets 2.5–3 mm. long, incurved, grayish, narrowly keeled on the back and sharply rugose with the surface between papillate or sometimes muriculate.

Grassy hills and valleys, becoming a common field and roadside weed, Transition and Sonoran Zones; Washington, on both sides of the Cascades, to Idaho, and south to Arizona, southern California and northern Lower California. Type locality: near Bodega Bay, California.

An extremely variable species of wide geographic range. Suksdorf (*Werdenda* 1: 48–113. 1931) in a study of the genus has proposed many new species, a large number of which belong to this complex, but extensive cytogenetic studies are needed before the biological significance of these variations can be determined. In the desert regions strongly pustulate forms which sometimes have been referred to *Amsinckia echinata* A. Gray suggest hybridization between *Amsinckia intermedia* and *Amsinckia tessellata*.

Amsinckia intermedia var. *Eastwoodiae* (J. F. Macbride) Jepson & Hoover in Jepson, Fl. Calif. 3: 323. 1943. (*Amsinckia Eastwoodiae* J. F. Macbride, Contr. Gray Herb. No. 49: 14. 1917; *A. Douglasiana* var. *Eastwoodiae* I. M. Johnston, Bull. S. Calif. Acad. 17: 66. 1918; *A. Johnstonii* Suksd. *Werdenda* 1: 68. 1931.) Vegetative characters similar to the typical species, but corolla 15–20 mm. long and deep orange. Sacramento and San Joaquin Valleys, also cismontane southern California. Type locality: "near Pollasky [Friant], Fresno Co.," California.

8. *Amsinckia retrorsa* Suksd. Rigid Fiddle-neck or Harvest Fireweed. Fig. 4335.

Amsinckia retrorsa Suksd. Deutsch. Bot. Monatss. 18: 134. 1900.

Amsinckia parviflora Heller, *Muhlenbergia* 2: 313. 1907. Not Bernh. 1833.

Amsinckia Helleri Brand, Rep. Spec. Nov. 25: 212. 1928.

Stems strictly erect, 3–8 dm. high, usually simple below the inflorescence, bristly-hirsute and often more or less cinereous with fine appressed pubescence. Leaves linear or the upper linear-lanceolate, hirsute on both sides with ascending or appressed hairs; inflorescence of 1 or few, strict, erect or ascending racemes, bractless; calyx-lobes 5, distinct, 7–13 mm. long, linear or linear-lanceolate; corolla light yellow, 5–7 mm. long, the tube included or only slightly exerted beyond the calyx-lobes; style 2.5–3 mm. long; nutlets 2–3 mm. long, broadly ovoid, densely tuberculate all over, with scattering larger tubercles intermixed, the latter on central and lateral ridges when these are present.

Moist slopes and fields, Arid Transition and Upper Sonoran Zones; Washington, mainly east of the Cascades, south to southern California, east to Idaho and Nevada. Type locality: near Bingen, Klickitat County, Washington. April–Aug.

9. *Amsinckia micrantha* Suksd. Small-flowered Fiddle-neck. Fig. 4336.

Amsinckia micrantha Suksd. Deutsch. Bot. Monatss. 18: 134. 1900.

Stem simple below or sometimes branching from the base, slender and often decumbent, 3–6 dm. long, sparsely bristly-hirsute, with little or no finer pubescence. Leaves broadly linear or oblong, the upper sometimes lanceolate, 4–10 cm. long, thinly hirsute with mostly straight, ascending, but not appressed, pustulate hairs; spikes becoming lax and elongated, bractless or sometimes with 1 or few bracts near the base; calyx 6–8 mm. long in fruit, lobes lanceolate, thinly bristly and with few or no whitish hairs on the margins; corolla pale yellow, 4–5 mm. long, tube included or slightly surpassing the calyx, lobes minute; nutlets triangular, 2.5–3 mm. long, with a narrow, toothed, dorsal ridge and similar lateral ones, the intervals between finely tuberculate.

Grasslands, Upper Sonoran and Transition Zones; mainly east of the Cascades from British Columbia and Idaho south to the Willamette Valley and eastern Oregon. Type locality: near Bingen, Klickitat County, Washington. May–Aug.

10. *Amsinckia lycopsoides* Lehm. Bugloss Fiddle-neck. Fig. 4337.

Amsinckia lycopsoides Lehm. Del. Sem. Hort. Hamb. 7. 1831.

Amsinckia arenaria Suksd. Deutsch. Bot. Monatss. 18: 133. 1900.

Amsinckia simplex Suksd. *Werdenda* 1: 33. 1927.

Amsinckia Howellii Brand, Rep. Spec. Nov. 25: 213. 1928.

Amsinckia glomerata Suksd. *Werdenda* 1: 52. 1931.

Stems erect to procumbent with long spreading branches, 3–10 dm. long, bristly-hirsute with



4333



4334



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4341



4340

4333. *Amsinckia spectabilis*
 4334. *Amsinckia intermedia*
 4335. *Amsinckia retrorsa*

4336. *Amsinckia micrantha*
 4337. *Amsinckia lycopoides*
 4338. *Asperugo procumbens*

4339. *Harpagonella Palmeri*
 4340. *Verbena bonariensis*
 4341. *Verbena hastata*

little or no fine pubescence. Lower leaves linear-oblancoale, the upper lanceolate to narrowly ovate, bristly-hirsute with spreading or appressed hairs; spikes often bracteate below, becoming loosely flowered but not greatly elongated; fruiting calyx 6–10 mm. long, the lobes linear-lanceolate, bristly-hirsute and the margin densely long-ciliate; corolla deep yellow, usually well-exserted, 7–10 mm. long, the throat nearly closed by hairy, saccate intrusions; stamens inserted below the middle of the corolla-tube; nutlets triangular-ovoid, 2.5–3 mm. long, only obscurely keeled dorsally, closely muricate, but not rugose, or only slightly so.

Usually in moist ground, Upper Sonoran and Transition Zones; Washington and Oregon, on both sides of the Cascades, south to central California and Nevada. Type locality: described from cultivated plants grown from seeds collected by Douglas, probably those listed by him in his *Journal* (page 116, species 151) "... seeds not yet known; this very interesting species was found on Menzies Island [near Vancouver, Washington] in company with Mr. Scouler; scarce, only three specimens of it were found, two of which are in my possession. I have since found it in abundance near all the Indian lodges above the Rapids of the Columbia. S." The "S" means seeds were collected. April–June.

24. *ASPERÙGO* [Tourn.] L. Sp. Pl. 138. 1753.

Rough-hispid, procumbent, annual herb, with alternate, entire leaves, and small white or blue flowers borne solitary or 2–3 together in the upper axils. Calyx campanulate, unequally 5-cleft, the toothed lobes enlarged and folded together in fruit. Corolla tubular-campanulate, 5-lobed, lobes imbricated. Stamens 5, inserted on the corolla-tube, included; filaments very short. Ovary 4-divided; style short; stigma capitate. Nutlets 4, ovoid, erect, keeled, granular-tuberculate, attached laterally above the middle to the long-conic receptacle. [Name Latin, meaning rough, referring to the pubescence of the foliage.]

A monotypic genus of Europe and Asia.

1. *Asperugo procumbens* L. Catchweed or German Madwort. Fig. 4338.

Asperugo procumbens L. Sp. Pl. 138. 1753.

Stems often diffusely branched, slender and procumbent or ascending, 2–5 dm. long, retrorsely short-hispid. Leaves scabrous, obovate to oblanceolate, 3–6 cm. long, obtuse or acutish at apex, the lower mostly oblanceolate and narrowed to a winged petiole; flowers short-pedicelled, blue, about 2–3 mm. broad; calyx in fruit 8–15 mm. broad, dry and membranous, strongly veined; nutlets obliquely ovoid, about 4 mm. long, granulate-tuberculate.

Locally abundant along roadsides and in fields in eastern Oregon, especially Grant and Umatilla Counties. Adventive from Europe. May–Aug.

25. *HARPAGONÉLLA* A. Gray, Proc. Amer. Acad. 11: 88. 1876.

Small pubescent annual with the stems branching from the base. Flowers minute, white, racemously disposed along the bracteate branches. Calyx in flower slightly, but in fruit exceedingly, unequal; 3 of the lobes nearly distinct, the other 2 united to above the middle, closely enwrapping the fruit and armed dorsally with 5–9 soft uncinat spines. Corolla minute, subbracteate. Style entire. Ovary 2-parted. Nutlets 1 or sometimes 2, thin-coriaceous, smooth, obliquely attached by the narrow base to the small depressed gynobase. [Name diminutive of Latin *harpago*, a grappling hook.]

A monotypic genus of southwestern United States and adjacent Mexico.

1. *Harpagonella Pálmeri* A. Gray. *Harpagonella*. Fig. 4339.

Harpagonella Pálmeri A. Gray, Proc. Amer. Acad. 11: 88. 1876.

Stem usually branched from or near the base, the branches few and ascending, or sometimes diffuse, 2.5–20 cm. long, thinly appressed-pubescent. Leaves narrowly linear to linear-lanceolate, 0.5–3.5 cm. long, 1–3 mm. wide, appressed-pubescent beneath, appressed-hispid above with the hairs pustulate at base; bracts 2–8 mm. long, linear to linear-lanceolate; pedicels short, stout, becoming recurved; corolla white, barely 2 mm. long; calyx-lobes 1–1.5 mm. long in flower, 2–3.5 mm. long in fruit, narrowly linear, armed with several uncinat prickles; nutlets 1 or 2, completely enclosed in the oblong or fusiform somewhat indurate calyx-tube.

Dry barren mesas and hillsides, Lower Sonoran Zone; cismontane southern California, frequent in western San Diego County; rare and local northward, San Luis and Pasadena, Los Angeles County; Murietta, Riverside County; Catalina Island, southward to Lower California. Type locality: Guadalupe Island, Lower California. March–April.

Family 133. VERBENÀCEAE.

VERVAIN FAMILY

Herbs, shrubs or trees with usually opposite or verticillate, simple or compound leaves. Flowers perfect, usually more or less irregular, in terminal or axillary spikes, racemes or panicles. Calyx generally 4–5-toothed or 4–5-cleft, persistent. Corolla sympetalous, hypogynous, regular or more or less 2-lipped, the tube cylindric, the limb 4–5 lobed. Stamens 4, didynamous, rarely 2 or 5, inserted on the corolla-

tube and alternate with the lobes; anthers 2-celled, longitudinally dehiscent. Ovary superior, 2-4-celled; ovules usually solitary in each cell; style simple; stigmas 1 or 2. Fruit dry, separating at maturity into 2 or 4 nutlets, or a drupe containing 2-4 nutlets.

A family of about 80 genera and approximately 800 species, inhabiting mostly tropical and subtropical regions.

Ovary 4-celled; fruit of 4 nutlets; our species annual or perennial herbs.

1. *Verbena*.

Ovary 2-celled; fruit tardily separating into nutlets.

Calyx 2-lobed, tube flattened, 2-angled; bracts broad, persistent; flowers imbricated in pedunculate heads or short spikes; creeping herbs.

2. *Phyla*.

Calyx 4-lobed, tube 4-angled, not flattened; bracts narrow, deciduous; flowers in loose slender spikes; aromatic shrubs.

3. *Aloysia*.

1. VERBENA [Tourn.] L. Sp. Pl. 18. 1753.

Herbs or a few species shrubby, with mostly opposite leaves. Flowers bracteate, variously colored, in terminal corymbose or paniculate spikes. Calyx generally tubular, 5-angled, more or less unequally 5-toothed. Corolla salverform or funnelform, its limb spreading, 5-lobed, regular or slightly 2-lipped. Stamens 4, didynamous, rarely only 2, included; anthers unappendaged or sometimes bearing a gland. Ovary 4-celled; ovules solitary in each cell; style 2-lobed, only one of the lobes stigmatic. Fruit dry, mostly enclosed by the calyx, or at length separating into 4 linear or linear-oblong, smooth or roughened, 1-seeded nutlets. [Latin name of a sacred herb.]

A genus of about 100 species, chiefly American tropical and subtropical regions. Type species, *Verbena officinalis* L.

Flowers in more or less slender spikes; corolla 3-6 mm. long; anthers not appendaged.

Bracts inconspicuous, lanceolate-subulate, shorter than or barely exceeding the calyx.

Leaves sessile and more or less auriculate-clasping; spikes short and compact.

1. *V. bonariensis*.

Leaves petioled; spikes elongated in fruit and open at least below.

Spikes paniculate, much elongated and very slender.

Leaves abruptly narrowed to the wingless or obscurely winged petiole.

Perennial; herbage more or less strigose; leaves rarely slightly scabrous on the upper surface.

2. *V. hastata*.

Annual; herbage decidedly scabrous.

3. *V. scabra*.

Leaves tapering at base to a distinctly winged petiole, incisely toothed or lobed.

4. *V. menthaefolia*.

Spikes in threes at the ends of the branches, often congested in flower.

Leaves canescent, upper surface not scabrous; spikes becoming elongated and loosely flowered in fruit.

5. *V. lasiostachys*.

Leaves bright green, scabrous on the upper surface; spikes usually not greatly elongated and flowers remaining congested in fruit.

6. *V. robusta*.

Bracts conspicuous, lanceolate or lanceolate-oblong, much exceeding the calyx.

7. *V. bracteata*.

Flowers in head-like spikes; corolla about 10 mm. long, the lobes obcordate; anther-connectives appendaged.

8. *V. Gooddingii*.

1. *Verbena bonariensis* L. Cluster-flowered Verbena. Fig. 4340.

Verbena bonariensis L. Sp. Pl. 20. 1753.

Stems up to 1 m. in height, nearly square in cross section, sparsely hirsutulous with spreading hairs or subglabrous below. Leaves opposite, decussate, lanceolate, sessile, subauriculate, acutely and rather deeply serrate, 5-10 cm. long, strigillose above, short-pubescent beneath with spreading hairs, prominently veined; spikes densely flowered, 2-4 cm. long in crowded cymes terminating the branches of the inflorescence; bracts lanceolate-subulate, barely equaling to slightly exceeding the calyx, strigose especially on the margins and midrib; calyx 3 mm. long, pubescent with ascending hairs, the lobes rather abruptly narrowed to a short subulate tip; corolla-tube about 5 mm. long, the limb scarcely 1 mm. broad; nutlets 2 mm. long, commissural faces scarcely extending to the apex of the nutlet, muricate-scabrous.

Native of South America; introduced in the Southern States and in the Sacramento Valley, Yuba County, California. Type locality: Buenos Aires, Argentina. May-Nov.

Verbena litoralis H.B.K. Nov. Gen. & Sp. 2: 276. pl. 137. 1818. (*Verbena Hansenii* Greene, Pittonia 3: 308. 1898.) Stems erect, up to 1 m. in height, simple below, mostly trichotomously branched above, glabrous or usually sparsely scabrous especially on the angles; lower leaves lanceolate to oblong, narrowed below to a very short petiole or sessile, decussate, the upper becoming reduced, linear-lanceolate and entire, strigillose on both surfaces; spikes terminal, cymosely arranged or often paniced, rather densely flowered, often elongated in fruit; bracts lanceolate-subulate, 2 mm. long, strigose; calyx 2-2.5 mm. long, strigillose, the teeth subequal, subulate about as long as the tube; corolla slightly exceeding the calyx, the limb 2.5-3 mm. broad; nutlets trigonous, barely 1.5 mm. long, scabrous on the commissural faces, inconspicuously reticulate at apex. Locally established in California: Amador County, *Hansen*; San Joaquin County, *Jepson*; Shasta County, *M. S. Baker*. Native of Mexico, and Central and South America. Type locality: "prope Truxillo, Santa et Lima."

2. *Verbena hastata* L. Blue Vervain. Fig. 4341.

Verbena hastata L. Sp. Pl. 20. 1753.

Stems one or two from a perennial root, strict, 4-8 dm. high, strigose-hispidulous. Lower leaves oblong-lanceolate, sometimes hastate, acute at apex, the upper narrowly lanceolate and acuminate, 6-9 cm. long, serrate or incised-dentate with acute teeth, short-petioled, thinly stri-

gose above and slightly scabrous, more densely strigose beneath; spikes short-pedunculate, more or less crowded on the short branches, densely flowered; bracts lanceolate, acuminate, shorter than the calyx, hispidulous at least on the margins; calyx 2 mm. long, sparsely strigose-hispidulous, teeth short, acuminate, connivent in fruit; corolla blue, pink or white, its limb 2.5–3 mm. broad; nutlets 2 mm. long; smooth or faintly striate, commissural faces smooth or sparsely muriculate, brownish.

Moist ground, Transition and Sonoran Zones; British Columbia south through Washington and Oregon, on both sides of the Cascade Mountains to Central California. Type locality: "Habitat in Canadæ humidis." June–Sept.

Verbena stricta Vent. Descr. Pl. Jard. Cels, pl. 53. 1800. Mullen-leaved Vervain. Similar to *Verbena hastata* L. but leaves sessile and densely soft-pubescent. Widely distributed from Montana and Texas eastward. In the Pacific States it has been collected only at Myers Falls, Stevens County, Washington. Type locality: Illinois.

3. *Verbena scàbra* Vahl. Rough Vervain. Fig. 4342.

Verbena scabra Vahl, Ecol. Amer. 2: 2. 1798.

Annual, stems erect, 4–8 dm. high, simple below, usually branching above, rather slender, hispidulous. Leaves ovate to ovate-oblong or ovate-lanceolate, 4–7 cm. long, abruptly narrowed below to a slender petiole, serrate, scabrous on both surfaces; spikes very slender, 8–15 cm. long; bracts subulate, about 1 mm. long; calyx 2 mm. long, hispidulous, teeth about 0.5 mm. long, connivent in fruit; corolla-tube slightly exceeding the calyx, limb about 2 mm. broad; nutlets 1.5 mm. long, striate, commissural surface whitish-puberulent.

Moist places, Sonoran Zones; Los Angeles, San Bernardino, Riverside, and Orange Counties, California, and northern Lower California; also southern Arizona and Texas, east to North Carolina and south to Mexico and West Indies. Type locality: "Habitat in America meridionali."

This species has been confused with *V. urticifolia* L., but readily distinguished by its scabrous herbage.

4. *Verbena menthaefòlia* Benth. Mintleaved Vervain. Fig. 4343.

Verbena menthaefolia Benth. Pl. Hartw. 21. 1839.

Annual or short-lived perennial, stems several from the crown of a stout root, 4–6 dm. high, more or less strigose-pubescent. Leaves narrowed to a slender petiole about 1 cm. long, the blades irregularly pinnatifid and serrate, lanceolate to ovate-lanceolate in outline, 2.5–3 cm. long, strigose and somewhat canescent on both surfaces, pinnately veined; spikes terminating the branches slender, becoming elongated and open in fruit, 1–20 cm. long, strigose-canescens; bracts lanceolate-subulate, 2 mm. long; calyx 2.5–3 mm. long, teeth minute; corolla purple, tube distinctly exserted, stigmillose, limb 5–6 mm. broad, lobes truncate, nutlets trigonous, 2–2.5 mm. long, striate, reticulate above, commissural faces muricate.

Dry hillsides and mesas, Sonoran Zones; Riverside and San Diego Counties, California, and southwestern Arizona to Lower California and southern Mexico. Type locality: Leon, Guanajuato. April–June.

Verbena officinàlis L. Sp. Pl. 20. 1753. Similar to *Verbena menthaefolia*. Inflorescence more or less densely glandular and viscid-pubescent whereas in *V. menthaefolia* it is more or less densely strigillose-canescens and nonglandular. Native of Europe. Introduced in eastern United States, and has appeared as a ballast plant in Portland (Linnton), Oregon, and as an introduction in Amador County, California.

5. *Verbena lasiostàchys* Link. Western Vervain. Fig. 4344.

Verbena prostrata R. Br. in Ait. Hort. Kew. ed. 2. 4: 41. 1812. Not Savi 1802.

Verbena lasiostachys Link, Enum. Hort. Berol. 2: 122. 1822.

Stems erect or ascending, at first, becoming much-branched and diffuse or decumbent, 2–5 dm. long, villous. Leaves ovate to oblong-ovate, cuneately narrowed at base to a narrowly winged petiole, acutely incised and serrate, often 3–5-cleft, pubescent on both surfaces with upwardly curved hairs, somewhat canescent; spikes solitary or often in threes at the ends of the branches, densely flowered in anthesis, becoming elongated and loosely flowered later, villous-hirsute and finely glandular; bracts lanceolate-subulate, about equaling or shorter than the calyx; the latter about 4–5 mm. long, more or less connivent over the nutlets in fruit; corolla purple, rarely white, the tube slightly exceeding the calyx, sparsely pubescent without, the limb 3–4 mm. wide; nutlets oblong-trigonus, the back strongly reticulate at the apex and striate below, the striae fading out toward the base.

Dry open ground, Upper Sonoran and Transition Zones; Umpqua Valley, western Oregon, to northern Lower California. Type locality: not definitely known, but probably coastal California. May–Sept.

Verbena lasiostachys var. *septentrionalis* Moldenke, Amer. Midl. Nat. 24: 753. 1940. "Differs from the typical form in its calyx being in all only 3–4 mm. long." The type was collected near Medford, Oregon, and it seems to be the prevailing form in Oregon and in the North Coast Ranges and the Sierra Nevada to Kern County, California.

Verbena lasiostachys var. *Abramsii* (Moldenke) Jepson, Fl. Calif. 3: 381. 1943. (*Verbena Abramsii* Moldenke, Amer. Midl. Nat. 24: 740. 1940.) Similar to the above but the calyx "only 2–3 mm. long and very minutely toothed." This form, described originally from San Diego County, occurs also in the southern Sierra Nevada, and on the desert slopes of the mountains of southern California, especially of the San Gabriel and San Bernardino Ranges.

6. *Verbena robùsta* Greene. Robust Vervain. Fig. 4345.

Verbena robusta Greene, Pittonia 3: 309. 1898.

Verbena lasiostachys var. *scabrìda* Moldenke, Amer. Midl. Nat. 24: 753. 1940.

Stems erect, 5–9 dm. high, solitary or sometimes two or more from the stout perennial root, paniculately branched above, herbage rather bright green, sparsely hirsute or glabrate. Leaves

ovate to oblong-ovate, 4-8 cm. long, the cuneate base tapering into a winged petiole, irregularly serrate dentate or incised, at least the lower usually 3-cleft or 3-lobed near the base, the teeth prominently apiculate, upper surface scabrous the lower thinly hispidulous; spikes short-peduncled or subsessile, densely flowered, 3-10 cm. long, glandular and hirsutulous; bracts lanceolate-subulate, slightly exceeding the calyx; calyx 3-4 mm. long, lobes not connivent in fruit; corolla-tube puberulent without and slightly so within, limb 2-3 mm. broad; nutlets oblong-trigonal, 1.5-2 mm. long, reticulate above, the striae becoming obscure toward the base, commissural face densely muriculate and gray.

Banks and borders of winter pools, Sonoran Zones; Marin, Alameda and Tuolumne Counties to Santa Catalina Island, California and to northern Lower California. Type locality: "Dry hills about San Francisco Bay, especially near Point Isabel on the eastern shore, and on Point Tiburon." May-Nov.

7. *Verbena bracteata* Lag. & Rodr. Bracted Vervain. Fig. 4346.

Verbena bracteata Lag. & Rodr. Anal. Cienc. Nat. 4: 260. 1801.

Verbena bracteosa Michx. Fl. Bor. Amer. 2: 13. 1803.

Stems solitary or several from an annual or short-lived perennial root, decumbent or ascending, often diffusely branched, 15-35 cm. high, hirsute. Leaves, at least the lower, usually 3-lobed, narrowed to a winged petiole, the middle lobe larger, cuneate-obovate and incised or toothed, the lateral narrow and divaricate, hirsute below, appressed-hirsutulous above; spikes terminal, sessile, 4-12 cm. long in fruit; bracts conspicuous, much exceeding the flowers, recurved in age, the upper linear-lanceolate, the lower often toothed or divided and leaf-like; calyx 3-4 mm. long, hirsute, teeth very short, connivent in fruit; corolla limb 2.5-3 mm. broad; nutlets about 2 mm. long, prominently reticulate above, becoming only faintly striate toward the base.

Roadsides and waste places, in heavy or sandy soil, Transition and Sonoran Zones; British Columbia, Washington and Oregon, east of the Cascade Mountains, and central and southern California, ranging east across the continent. Type locality: originally described from a plant cultivated in Madrid. May-Oct.

8. *Verbena Gooddingii* Briq. Desert Vervain. Fig. 4347.

Verbena Gooddingii Briq. Ann. Conserv. & Jard. Bot. Genève 10: 103. 1907.

Verbena verna var. *fissa* A. Nels. Amer. Journ. Bot. 18: 437. 1931.

Verbena bracteata var. *Gooddingii* Jepson, Fl. Calif. 3: 382. 1943.

Stems usually several from a perennial root, erect or decumbent at base, 2-5 dm. high, pale green, villous-hirsute, more or less glandular. Leaves cinereous-green, villous-hirsute, 2.5-4 cm. long, ovate in outline, narrowed to a winged petiole, 3-cleft, the divisions toothed or incised; spikes pedunculate, congested and head-like when young, becoming 2-4 cm. long in age; bracts lanceolate, 6-8 mm. long, hirsute; calyx villous-hirsute and glandular, 7-8 mm. long, teeth 1.5-2 mm. long, subulate; corolla light purple, pubescent without, limb 8-10 mm. broad, lobes retuse; nutlets 3-3.5 mm. long, cylindric, conspicuously reticulate to near the striate base, commissural face with a band of retrorsely hispidulous whitish hairs.

Dry canyon floors, Lower Sonoran Zone; Clark and Providence Mountains, Mojave Desert, California, to Nevada, Utah, Arizona, Sonora and Lower California. Type locality: "Kernan, Meadow Valley wash, Nevada." April-June.

2. PHŶLA Lour. Fl. Cochinch. 66. 1790.

Perennial herbs with procumbent or creeping stems, glabrous or strigose with 2-forked hairs. Leaves opposite, toothed or lobed. Flowers in congested spikes terminating solitary axillary peduncles. Bracts cuneate-obovate or flabelliform, often with scarious colored margins. Calyx short, flattened, 2-lobed. Corolla 2-lipped, the tube a little longer than the calyx, violet, blue, pink, or white. Stigma subcapitate, obscurely 2-lobed. Fruit obovoid, surrounded by the membranous calyx, the 2 nutlets adhering or tardily separating from each other. [Named from the Greek *phylon*, meaning a tribe or race, also a swarm or school, probably in reference to the spreading mat-like growth.]

A genus of about 15 species, inhabiting warm temperate and tropical regions in both hemispheres. Type species, *Phyla chinensis* Lour.

Leaves broadest below the middle, serrate from below the middle to the apex; calyx-lobes about equaling the tube.
1. *P. lanceolata*.

Leaves broadest above the middle, serrate only above the middle to the apex, or only at the apex; calyx-lobes only about one-half the length of the tube.

Teeth of the leaf-margins spreading; leaves obtuse at apex, tapering gradually to the usually sessile base.
2. *P. incisa*.

Teeth of the leaf-margins pointing forward; leaves mostly acute at apex, abruptly narrowed below to a short winged petiole.
3. *P. nodiflora* var. *rosea*.

1. *Phyla lanceolata* (Michx.) Greene. Frog-fruit or Frog-fruit. Fig. 4348.

Lippia lanceolata Michx. Fl. Bor. Amer. 2: 15. 1803.

Phyla lanceolata Greene, Pittonia 4: 17. 1899.

Stems procumbent, from a slender perennial rootstock, rooting at the lower nodes, 25-40 cm. long, herbage green and glabrate or thinly strigose with appressed 2-forked hairs. Leaves opposite, 3-6 cm. long, ovate to lanceolate, broadest below the middle, cuneately narrowed below to a short petiole, acute at apex, sharply serrate to below the middle, lateral veins prominent, upper surface plane; peduncles slender, usually well exceeding the leaves; spikes ovoid to short-cylindrical.

dric, 10–15 mm. long; bracts broadly ovate, abruptly apiculate, thinly strigose, margins membranous and often purple-tinged; calyx 2-lobed, 2 mm. long, the lobes about equaling the tube; corolla pale blue or lavender, 2.5–3 mm. long, the tube little exceeding the calyx, sparsely strigose exteriorly at base of lobes, lower lip short; fruit globose, 2 mm. long.

Moist soils, Sonoran Zones; Sacramento and San Joaquin Valleys and the cismontane valleys of southern California, east to the Atlantic Coast. Type locality: "in Carolina, juxta amniculum *Ashley*." May–Sept.

2. *Phyla incisa* Small. Narrow-leaved Fog-fruit. Fig. 4349.

Phyla incisa Small, Fl. S.E.U.S. 1012, 1337. 1903.

Lippia incisa Tidestrom, Proc. Biol. Soc. Wash. 48: 42. 1935.

Stems branching at the base, spreading or creeping and often rooting at the nodes, simple or usually branched. Leaves linear-cuneate, 1–3.5 cm. long, incisely 2–8-toothed above the middle, strigillose-canescens, midvein evident, lateral vein none or very obscure; peduncles 3–7 cm. long, over twice as long as the leaves; heads subglobose becoming cylindric and 1–2 cm. long in age; bracts rhomboidal, 2 mm. long, acute, strigillose; calyx barely 2 mm. long, strigillose; corolla 2.5–3 mm. long, white or bluish; lower lip with middle lobe a little larger than the lateral ones; fruit broadly obovoid, 1.5–2 mm. long.

Low moist ground, Lower Sonoran Zone; San Joaquin Valley and Imperial Valley, California; also in Texas. Type locality: southern Texas. April–Oct.

3. *Phyla nodiflora* var. *rosea* (D. Don) Moldenke. Garden Lippia. Fig. 4350.

Zappania nodiflora var. *rosea* D. Don in Sweet, Brit. Flow. Gard. II. 3: pl. 225. 1834.

Lippia filiformis Schrad. Ind. Sem. Hort. Gotting. 1834.

Phyla nodiflora var. *rosea* Moldenke, Phytologia 2: 22. 1941.

Stems creeping forming mats, becoming suffrutescent, the young branches cinereous-strigillose. Leaves pale green and more or less strigillose, narrowly oblanceolate to narrowly obovate, acutish to broadly obtuse at apex, entire or usually with 1–3 pairs of minute teeth above the middle, more or less acutely (not truly cuneate) narrowed below, 12–20 mm. long, including the short slender petiole, lateral veins obscure or none; peduncles 1.5–3 cm. long; spikes ovoid, acute at apex, 6 mm. thick; bracts ovate, acute, often purple, thinly strigillose; corolla 4–5 mm. long, rose-colored, the lower lip about two-thirds the length of the tube.

The commonly cultivated "Lippia" has become well established in many places in central and southern California. Native of South America. May–Oct.

Phyla nodiflora var. *canescens* (H. B. K.) Moldenke, Phytologia 1: 98. 1934. (*Lippia canescens* H. B. K. Nov. Gen. & Sp. 2: 263. 1817.) Stems prostrate, the old branches woody and rooting, forming mats; leaves opposite, often with smaller fascicled ones in the axils on short branchlets, linear-oblanceolate to spatulate-cuneate, 1–2 cm. long, acutish to rounded at apex, with 2–3 (rarely 4) pairs of minute teeth above, subsessile or with a short winged petiole; spikes subspherical when young, narrowly cylindric in age, 4–5 mm. thick, 15–30 mm. long, rounded at apex; bracts broadly ovate to suborbicular, very obtuse at apex, margin often erose; calyx 2 mm. long, lobes narrow; corolla purple or white, 3 mm. long, lower lip scarcely half the length of the tube. Low ground, San Joaquin and Imperial Valleys, California. Introduced in the Imperial Valley and probably also in the San Joaquin. Type locality: Truxillo, Peru.

Phyla nodiflora var. *reptans* (H. B. K.) Moldenke, Torreya 34: 9. 1934. (*Lippia reptans* H. B. K. Nov. Gen. & Sp. 2: 263. 1817.) Stems creeping, much-branched and rooting at the lower nodes, forming large dense mats often 2 or 3 m. broad, herbage rather densely cinereous-strigillose; leaves mostly with short leafy branchlets in the axils, the blades oval to obovate-cuneate, 12–25 mm. long, acutish to obtuse at apex, rather abruptly or cuneately narrowed to a short winged petiole, serrate with 4–5 pairs of approximate teeth, prominently veined beneath; peduncles 2–6 cm. long; spikes ovoid or long-ovoid, 10–15 mm. long, about 6 mm. thick; bracts ovate, acute, strigillose, the margins membranous and often rose-purple; corolla-tube well-exserted. Low ground, Sonoran Zones; Sacramento Valley, California. Type locality: "Crescit locis siccis Provinciae Cumanaensis," Venezuela.

3. *ALÓYSIA* Ortega ex Pers. Syn. Pl. 2: 139. 1807.

Aromatic shrubs, with opposite, entire or toothed leaves. Flowers small, in slender axillary loosely flowered spikes or racemes, each subtended by a small deciduous bract. Calyx not flattened, the tube 4-angled, 4-lobed, the lobes subequal. Corolla 2-lipped, small, commonly purple or white. Fruit separating into 2 thin-walled nutlets. [Named in honor of Maria Louisa Theresa, wife of Charles IV of Spain.]

A genus of about 30 species, inhabiting the warm temperate and tropical regions of the western hemisphere. Type species, *Verbena triphylla* L'Her., the lemon verbena of gardens.

1. *Aloysia Wrightii* (A. Gray) Heller. Vera Dulce or Wright's Aloysia.

Fig. 4351.

Lippia Wrightii A. Gray ex Torr. Bot. Mex. Bound. 126. 1859.

Aloysia Wrightii Heller, Muhlenbergia 1: 147. 1906.

Shrub 6–15 dm. high, with slender opposite tomentose branchlets. Leaves 5–10 mm. long, narrowly ovate to round-ovate, short-petioled, deeply and finely crenate, rugose, strigose above, densely cinereous-tomentose beneath; bracts lanceolate, equaling the calyx; calyx 2.5 mm. long, short-pedicelled, densely hirsute, lobes lanceolate about equaling the tube; corolla white, 3 mm. long, limb 2 mm. wide, lobes nearly equal; nutlets oblong, barely 2 mm. long, the scar oblong, extending almost to the apex, whitish.

Rocky slopes, Lower Sonoran Zone; Clark Mountain and Providence Mountains, Mojave Desert, California, to Arizona, New Mexico, and southwestern Texas; also northern Mexico from Sonora to Coahuila and Zacatecas. Type locality: Texas. May.

Family 134. MENTHACEAE.*

MINT FAMILY.

Aromatic punctate herbs or shrubs or some tropical species trees, mostly with 4-sided stems and simple opposite exstipulate leaves. Flowers mostly irregular and bilabiate, or rarely regular, variously clustered, the inflorescence typically cymose and bracteolate. Calyx persistent, 2-lipped or regular, mostly 5-toothed or 5-lobed. Corolla commonly 2-lipped with the upper lip 2-lobed or sometimes entire, and the lower lips 3-lobed, or sometimes nearly regular. Stamens borne on the corolla-tube and alternate with the lobes, generally 4 and didynamous, rarely equal, sometimes reduced to 2 with or without staminodia; anthers 2-celled, introrse or confluent 1-celled or sometimes one cell suppressed. Ovary 4-lobed or 4-parted, superior, each of the 4 divisions with a single usually anatropous ovule; style arising from the center of the ovary, 2-lobed at the summit. Fruit of four 1-seeded nutlets. Seed erect or transverse in *Scutellaria*; endosperm none or scanty; embryo mostly straight with a short inferior radicle.

A family of about 160 genera and 3,200 species of wide geographical distribution in temperate and tropical regions. In most species volatile oils are present in the foliage. The family is also known as the *Labiatae* or the *Lamiaceae*.

Ovary 4-lobed, style not basal; nutlets almost completely united, laterally attached. (*Ajugeae*.)

Corolla very irregular, apparently 1-lipped; stamens moderately exserted.

1. *Teucrium*.

Corolla nearly equally 5-lobed; stamens long-exserted.

2. *Trichostema*.

Ovary deeply 4-parted, style basal; nutlets almost distinct, basally attached.

Calyx 2-lipped, lips entire. (*Scutellariaeae*.)

Calyx bladderly-inflated in fruit; flowers in loose spikes; desert shrub.

3. *Salazaria*.

Calyx with helmet-like protuberance on the upper side; flowers solitary in the axils; herbs.

4. *Scutellaria*.

Calyx regularly 5-toothed (10-toothed in *Marrubium*) or 2-lipped with 3 teeth on the upper lip and 2 teeth on the lower lip. (*Stachyaeae*.)

Stamens and style included in the corolla-tube; calyx-teeth 10, spinescent, recurved and hooked in fruit.

5. *Marrubium*.

Stamens and style exserted beyond the corolla-tube; calyx-teeth 5, not recurved and hooked in fruit.

Stamens ascending, not declined and enveloped by the lower lip.

Corolla strongly 2-lipped, the lips unequal.

Upper pair of stamens longer than the lower.

Anther-sacs parallel or nearly so; upper stamens declined.

6. *Agastache*.

Anther-sacs divergent.

Calyx tubular, nearly equally 5-toothed, not at all 2-lipped.

7. *Nepeta*.

Calyx distinctly 2-lipped or unequally 5-toothed.

Trailing herbs; calyx unequally 5-toothed.

8. *Glechoma*.

Erect herbs; calyx 2-lipped.

9. *Moldavica*.

Upper pair of stamens shorter than the lower pair or equaling them.

Calyx closed in fruit, its upper lip truncate with 3 cusps on the margin, lower lip 2-cleft.

10. *Prunella*.

Calyx not closed in fruit, regularly 5-toothed or if 2-lobed the upper lip not truncate.

Upper lip of corolla concave.

Fertile stamens 4.

Calyx membranous in fruit; pollen-sacs nearly parallel.

11. *Dracocephalum*.

Calyx not membranous; pollen-sacs strongly divergent.

Calyx-teeth not spine-tipped or mucronate; corolla without hairy ring within.

12. *Lamium*.

Calyx-teeth spine-tipped or mucronate; corolla-tube with a hairy ring within.

13. *Stachys*.

Fertile stamens 2.

Calyx distinctly 2-lipped, or in one species of *Salvia* the orifice entire and very oblique.

Anthers with 2 approximate pollen-sacs.

14. *Acanthomintha*.

Anthers with the connective elongated and articulate with the filament, bearing 1 pollen-sac on the ascending end and a reduced sac or none on the other end.

15. *Salvia*.

Calyx equally 5-cleft.

16. *Monarda*.

Upper lip of corolla plane.

Anther-bearing stamens 2, the other two reduced to staminodia or wanting.

18. *Hedeoma*.

* Carl Epling's recent monographic studies of *Scutellaria* and other genera of the mint family have extended materially the knowledge of this family which is so richly represented in the Pacific States.

- Anther-bearing stamens 4, sometimes only 2 in *Pogogyne*.
 Flowers solitary or few in the axils of the leaves.
 Corolla with a hairy ring near the base within. 17. *Lepechinia*.
 Corolla naked within.
 Corolla-tube curved upward. 19. *Melissa*.
 Corolla-tube straight. 20. *Satureja*.
 Flowers capitate, spicate or capitate-verticillate in the axils of leaves or bracts.
 Calyx naked in the throat; bracts foliaceous, not colored.
 Annuals; verticils spicate; bracts conspicuously ciliate. 21. *Pogogyne*.
 Perennial herbs; verticils distant in the axils of reduced leaves, these not ciliate. 24. *Pycnanthemum*.
 Calyx bearded in the throat; bracts often colored, not ciliate. 22. *Origanum*.
 Corolla regular or nearly so, the lobes nearly or quite equal.
 Flowers in dense terminal heads, stamens 4; plants of dry habitats. 23. *Monardella*.
 Flowers in axillary whorls; plants of wet habitats.
 Stamens 2. 25. *Lycopus*.
 Stamens 4. 26. *Mentha*.
 Stamens declined and enveloped by the lower lip of the corolla. 27. *Hyptis*.

1. TEUCRIUM [Tourn.] L. Sp. Pl. 562. 1753.

Annual or perennial herbs or shrubs with entire, toothed or lacinate leaves. Flowers small, pink, white or purple, in terminal bracteate spikes or heads, or verticillate in the upper axils. Calyx campanulate, 10-nerved, with 5 equal or unequal lobes. Corolla-tube short, limb 2-lipped, upper lip short, 2-lobed, the lower with 2 short lateral lobes and a larger declined middle one. Stamens 4, exerted between the lobes of the upper lip, and curved downward, the anterior pair longer; anther-sacs divergent, confluent at base. Style 2-cleft. Nutlets 4, ovoid, rugose-reticulate. [Named for the Trojan king, Teucer.]

A genus of about 100 species, inhabiting temperate and tropical regions of both the eastern and western hemispheres. Type species, *Teucrium fruticans* L.

Herbs.

Perennial herb, villous; leaves lanceolate or narrowly ovate, sharply serrate. 1. *T. occidentale*.

Annual, glabrate, with several stems from the base; leaves obovate or spatulate, crenately incised. 2. *T. depressum*.

Shrub with elongated seasonal branches, glandular-punctate; leaves narrow, entire or with a basal pair of slender lobes or teeth, rarely pectinate. 3. *T. glandulosum*.

1. *Teucrium occidentale* A. Gray. Hairy Germander. Fig. 4352.

Teucrium occidentale A. Gray, Syn. Fl. N. Amer. 2¹: 349. 1878.

Perennial with a rootstock; stems simple or branched, 3–8 dm. high, villous-hirsute with soft glandular hairs. Leaves narrowly ovate to oblong-lanceolate, 4–9 cm. long, acute, rounded to short-cuneate at base, strigose-pubescent above, short-villous beneath; petioles densely villous, 5–10 mm. long; spikes dense or sometimes interrupted below, becoming 8–15 cm. long in fruit, densely villous and usually glandular; lower bracts lanceolate, the upper lanceolate-subulate; calyx 5–6 mm. long, viscid-villous; lower teeth acuminate, the upper shorter, acute or acutish; corolla about 10 mm. long, purple.

Moist soil, mainly Arid Transition Zone; British Columbia, Washington and Oregon, east of the Cascades, also Nevada, east to Maine, Pennsylvania, and New Mexico. Type locality: Nebraska. June–Aug.

2. *Teucrium depræssum* Small. Dwarf or Alkali Germander. Fig. 4353.

Teucrium depræssum Small, Bull. N.Y. Bot. Gard. 1: 288. 1899.

Teucrium cubense var. *densum* Jepson, Man. Fl. Pl. Calif. 861. 1925.

Usually much-branched from an annual taproot, the branches mostly spreading or decumbent, 1–4 dm. long. Lower leaves 10–25 mm. long, obovate-cuneate, crenately incised, petioled; upper leaves palmately 3-cleft into linear divisions, or 3–5-lobed, lower parts glabrate; inflorescence more or less soft-villous; pedicels 2–3 mm. long; calyx-teeth lanceolate-subulate, about 4 mm. long; corolla pale blue, 7–8 mm. long; nutlets prominently reticulate.

Low sandy ground, Lower Sonoran Zone; Colorado Desert (Hayfields, Palo Verde Valley, Colorado River bottoms), California east to Arizona and southwestern Texas. Type locality: "southern Texas." March–May.

3. *Teucrium glandulosum* Kell. Glandular Germander. Fig. 4354.

Teucrium glandulosum Kell. Proc. Calif. Acad. 2: 23. 1860.

Low shrub 1 m. high, the branches of the season often 4–5 dm. long, glabrous or puberulent at the nodes. Leaves 2–3.5 cm. long, linear or linear-lanceolate, narrowed above to an obtuse or rounded apex, and below to a sessile base or to a short winged petiole, entire, rarely pectinately toothed or with a pair of linear lobes near the base, glandular-punctate; flowers solitary in the axils of all but the lower leaves; pedicels slender, 1–3 cm. long; calyx 7–8 mm. long, glandular-dotted, tube prominently 10-nerved, teeth subequal, lanceolate, longer than the tube, pungently



4342



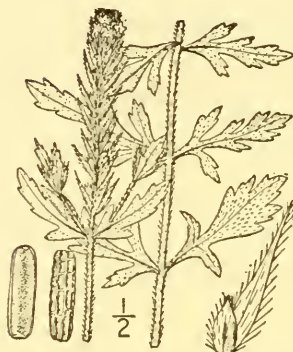
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4342. *Verbena scabra*4343. *Verbena menthaefolia*4344. *Verbena lasiostachys*4345. *Verbena robusta*4346. *Verbena bracteata*4347. *Verbena Gooddingii*4348. *Phyla lanceolata*4349. *Phyla incisa*4350. *Phyla nodiflora*



4351



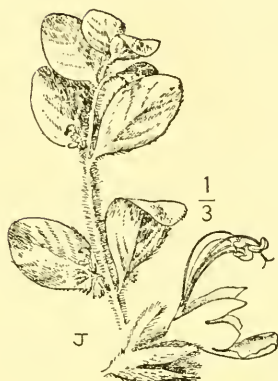
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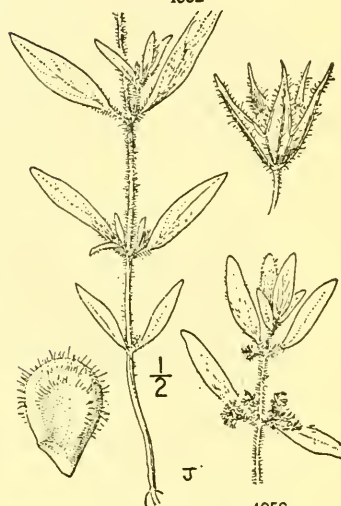
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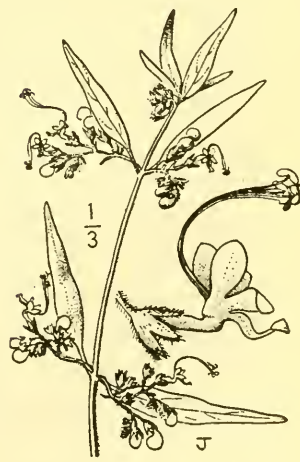
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4351. *Aloysia Wrightii*
 4352. *Teucrium occidentale*
 4353. *Teucrium depressum*

4354. *Teucrium glandulosum*
 4355. *Trichostema oblongum*
 4356. *Trichostema austromontanum*

4357. *Trichostema micranthum*
 4358. *Trichostema simulatum*
 4359. *Trichostema rubisepalum*

acute; corolla white veined with purple, tube barely equaling the calyx, lobes sparsely villous, the lower 6–8 mm. long.

Moist sandy soil or among rocks, Sonoran Zones; a Lower California species occurring on the mainland of the peninsula and on Cedros Island. An isolated colony has been discovered recently (F. W. Peirson, Annie M. Alexander) along the Colorado River in the Whipple Mountains, San Bernardino County, California. Type locality: Cedros Island. April–May.

2. *TRICHOSTÈMA* [Gronov.] L. Sp. Pl. 598. 1753.

Annual or perennial strong-scented herbs or rarely shrubby, with oblong or linear, entire or slightly repand leaves. Flowers usually blue or purple, paniculate, or in axillary cymes. Calyx campanulate, very unequally or nearly equally 5-lobed. Corolla-tube slender, exserted or included, limb oblique and deeply 5-cleft into oblong more or less declined segments. Stamens 4, didynamous, coiled in the bud, ascending curved and long-exserted in flower; anther-sacs divaricate, more or less confluent at base. Ovary deeply 4-lobed; style 2-cleft at the summit. Nutlet obovoid, reticulate. [Name Greek, meaning hair and stamen, referring to the long, very slender filaments.]

A genus of about 15 species, native of North America and principally on the Pacific Coast. Type species, *Trichostema dichotomum* L.

Annual herbs; margins of the leaves not revolute.

Nodes of the stems distant, leaves therefore scattered, not apiculate at apex.

Calyx-lobes subulate, about twice as long as the tube.

Leaves oblong to oval, obtuse or nearly so at both ends.

Leaves linear-lanceolate, tapering and acute at both ends.

Calyx-lobes triangular or lanceolate, about equaling the tube.

Corolla-tube about equaling or shorter than the calyx.

Calyx-lobes lanceolate; corolla barely 3 mm. long.

Calyx-lobes triangular-lanceolate; corolla 4–5 mm. long.

Corolla-tube distinctly longer than the calyx.

Stems glandular-villous and the calyx densely so; corolla-tube about 2 mm. longer than the calyx; filaments exserted beyond the corolla-limb about 4 mm.

Stems glandular-pubescent; calyx rather sparingly glandular-pilose; corolla-tube exserted beyond the calyx about 5 mm.; filaments exserted beyond the corolla-limb 8–10 mm.

Nodes of the stem approximate, the leaves therefore numerous, apiculate at apex.

Leaves lanceolate, obtuse or acutish at base.

Leaves ovate or round-ovate, rounded or subcordate at base.

Shrubby plants; leaves linear or linear-lanceolate, with revolute margins.

Inflorescence densely clothed with usually purple wool; cymes dense, simulating an interrupted spike; calyx about 8 mm. long, lobes lanceolate; filaments exserted 25–30 mm.

Inflorescence moderately clothed with tomentum or short wool, usually cinereous; cymes open with the peduncles and pedicels quite evident; calyx about 5 mm. long, the lobes triangular; filaments exserted 10–15 mm.

1. *T. oblongum*.

2. *T. austromontanum*.

3. *T. micranthum*.

4. *T. simulatum*.

5. *T. rubisepalum*.

6. *T. laxum*.

7. *T. lanceolatum*.

8. *T. ovatum*.

9. *T. lanatum*.

10. *T. Parishii*.

1. *Trichostema oblongum* Benth. Mountain Blue-curls. Fig. 4355.

Trichostema oblongum Benth. Lab. Gen. & Sp. 659. 1835.

Annual, stems slender, simple or sparingly branched, 5–30 cm. high, soft-villous throughout and more or less glandular above. Leaves oblong to oval or sometimes oblong-lanceolate, 2–3 cm. long, obtuse, thin, veins not costate; cymes many-flowered, on very short peduncles, villous; fruiting calyx 3–4 mm. long, the lobes lanceolate-subulate, about thrice as long as the tube; corolla 5–6 mm. long, the tube but slightly exserted beyond the calyx, the lobes villous without.

Moist ground, Transition and Canadian Zones; Spokane County, Washington, and adjacent Idaho, south to the southern Sierra Nevada and North Coast Ranges, California. Type locality: Fort Vancouver, Washington. June–Sept.

2. *Trichostema austromontanum* H. Lewis. San Jacinto Blue-curls. Fig. 4356.

Trichostema austromontanum H. Lewis, Brittonia 5: 284. 1945.

Annual, the stems erect, 1–3 dm. high, with rather distant nodes, branches appearing in pairs from all but the upper nodes, rather short-tomentose and more or less glandular with interspersed villous hairs. Leaves linear-lanceolate to oblong-lanceolate, narrowed at base to a short petiole, acute at apex, 1.5–3.5 cm. long, 2–8 mm. wide, tomentose; cymes small, several-flowered, mostly simple; calyx-lobes lanceolate-subulate, longer than the tube; corolla 3 mm. long, the tube equaling the calyx; stamens 5–6 mm. long; nutlets rather densely puberulent.

Mountain meadows, Arid Transition Zone; mountains of southern California, from the San Gabriel Ranges to the Cuyamaca Mountains; also an isolated colony on the eastern base of the Sierra Nevada (Fern Creek near Gull Lake, Mono County). Type locality: Lake Hemet, Riverside County, California. June–Oct.

Trichostema austromontanum subsp. *compactum* H. Lewis, Brittonia 5: 285. 1945. Plant low, compact, the leaves smaller; nutlets glabrous or very sparingly puberulent. Hidden Lake, San Jacinto Mountains, southern California.

3. *Trichostema micranthum* A. Gray. Small-flowered Blue-curls. Fig. 4357.

Trichostema micranthum A. Gray, Syn. Fl. N. Amer. 2: 348. 1878.

Stems simple or with a few branches, 10–25 cm. high, cinereous-pubescent or puberulent.

Leaves linear-lanceolate, tapering below to a short petiole, 2–2.5 cm. long, 2–3 mm. wide, veins not costate; cymules 2–7-flowered, on slender peduncles 4–8 mm. long; calyx 2.5 mm. long, the lobes barely longer than the tube, lanceolate; corolla 2–3 mm. long; stamens exserted about 1.5 mm.

Open pine forests, Arid Transition Zone; San Bernardino Mountains, southern California, and Hansen's Ranch, northern Lower California. Type locality: Bear Valley, San Bernardino Mountains, California. June–Sept.

4. *Trichostema simulatum* Jepson. Siskiyou Blue-curls. Fig. 4358.

Trichostema simulatum Jepson, Man. Fl. Pl. Calif. 862. 1925.

Annual, stems erect, 1–3 dm. high, glandular-villous throughout, nodes rather distant, at least the lower ones usually with a pair of spreading lateral branches. Leaves lanceolate to ovate-lanceolate, 2.5–4 cm. long, with slender petioles 5–10 mm. long, lateral veins not costate; cymules few-flowered and simple or sometimes, especially on the main stem, compound, nearly as long as the leaves and many-flowered; calyx 4 mm. long, the lobes triangular, acute, equaling the tube; corolla blue, 4 mm. long.

Open places, Arid Transition Zone; Josephine County, southern Oregon, to Trinity and Plumas Counties, northern California. Type locality: Klamathon, Siskiyou County, California. June–Aug.

5. *Trichostema rubisépalum* Elmer. Hernandez Blue-curls. Fig. 4359.

Trichostema rubisépalum Elmer, Bot. Gaz. 41: 310. 1906.

Trichostema laxum var. *rubisépalum* Jepson, Man. Fl. Pl. Calif. 862. 1925.

Annual, villous-tomentose and glandular throughout, with an erect stem 10–35 cm. high, and lateral branches appearing in pairs at the nodes. Leaves ovate-lanceolate to narrowly lanceolate, 2.5–4 cm. long, short-petioled; cymules simple and few-flowered or branched and flowers crowded; calyx-lobes triangular-lanceolate; corolla blue, 5–6 mm. long, the tube exceeding the calyx; stamens about 5 mm. long.

Moist banks, Upper Sonoran Zone; Sierra Nevada foothills, Tuolumne and Mariposa Counties; Inner Coast Ranges, San Benito County, California. Type locality: Hernandez, San Benito County, California. June–Aug.

6. *Trichostema laxum* A. Gray. Turpentine Weed. 4360.

Trichostema laxum A. Gray, Proc. Amer. Acad. 7: 387. 1868.

Annual, glandular-pubescent or glandular-puberulent throughout and strong-scented, stems erect, 2–4 dm. high, the internodes 4–8 cm. long, branches scattered along the stem and more or less spreading. Leaves linear-lanceolate to oblong-lanceolate, 3–4 cm. long, attenuate at apex, narrowed to a slender petiole at base; flowers in loose cymose panicles in the axils of the leaves; pedicels slender, about 3 mm. long; calyx 2–3 mm. long in flower, 4–5 mm. in fruit, glandular-villous; corolla-tube slender, 5–6 mm. long, the lobes 3–4 mm. long, pubescent; nutlets barely 2 mm. long, prominently reticulate, puberulent.

Moist sandy or gravelly soil, Upper Sonoran and Transition Zones; Umpqua and Rogue River Valleys, Oregon, south to Sonoma and Napa Counties, California. Type locality: "Near Little Geysers, Napa County," California. July–Sept.

7. *Trichostema lanceolatum* Benth. Vinegar Weed. Fig. 4361.

Trichostema lanceolatum Benth. Lab. Gen. & Sp. 659. 1835.

Annual, glandular-villous and cinereous, strong-scented, the stems simple or commonly with several stout ascending branches from near the base, 10–45 cm. high, leafy, the internodes usually less than 2 cm. long. Leaves sessile, lanceolate, acuminate, rounded or obtuse at base, 2–3 cm. long, prominently costate-veined, ascending; cymes in mostly simple racemes, about equaling the leaves; pedicels slender, 3–6 mm. long; calyx campanulate, villous-tomentose, 3 mm. long in flower, the lobes lanceolate, slightly longer than the tube; corolla light blue, the tube well-exserted, 5–7 mm. long, the lobes oblong, spreading or the lower declined; nutlets 2.5 mm. long, broadly obovoid, prominently reticulate.

Dry slopes and fields, often appearing as an autumnal weed in abandoned fields, Upper Sonoran and Transition Zones; Pacific Slope, from Willamette Valley, Oregon, to northern Lower California. Type locality: "Hab. in America boreali-occidentali prope arcem Vancouver, in siccis ad fluvium Multnomah, et in Nova California Douglas." Aug.–Oct.

8. *Trichostema ovatum* Curran. San Joaquin Blue-curls. Fig. 4362.

Trichostema ovatum Curran, Bull. Calif. Acad. 1: 154. 1885.

Annual, villous-pubescent and canescent throughout, 15–50 cm. high, branching from near the base, branches ascending, leafy, internodes about 1.5 cm. long. Leaves broadly ovate, ascending, 1–2 cm. long, apiculate at apex, the veins costate beneath; cymes simple, short-peduncled, few-flowered; pedicels slender, 2–3 mm. long; calyx densely villous-tomentose; corolla light blue, tube slender, about 6 mm. long and twice the length of the calyx, lobes densely villous externally; nutlets obovoid, prominently tuberculate, villous.

Dry plains and low hills, Lower Sonoran Zone; San Joaquin Valley, from Fresno County to Kern County, California. Type locality: Bakersfield. July–Oct.

9. *Trichostema lanatum* Benth. Romero or Woolly Blue-curls. Fig. 4363.

Trichostema lanatum Benth. Lab. Gen. & Sp. 659. 1835.

Erect shrub, 5–10 dm. high, the branches erect, leafy, densely floccose-tomentose when young. Leaves narrowly linear with revolute margins, 1-nerved, glabrate and shining above, more or less tomentose beneath, those on the main branches 3–6 cm. long, 4–5 mm. wide, narrowed below to a sessile base, those on the short axillary branchlets numerous and smaller, uppermost reduced to bracts; cymes in a terminal interrupted thyrsus, the whole inflorescence clothed with a dense violet or purple woolly tomentum; fruiting calyx 8–10 mm. long; corolla about 15 mm. long; stamens about 3 cm. long; nutlets 2.5–3 mm. long, reticulate-wrinkled, tomentose.

Dry rocky ridges, in the chaparral, Upper Sonoran Zone; California Coast Ranges from San Benito and Monterey Counties to the Santa Ana Mountains, Orange County, California. Type locality: California. Collected by Douglas. April–Aug.

10. *Trichostema Parishii* Vasey. Parish's Romero. Fig. 4364.

Trichostema Parishii Vasey, Bot. Gaz. 6: 173. 1881.

Trichostema lanatum var. *denudatum* A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 459. 1886.

Low erect shrub, the branches more or less tomentose, but not long-woolly. Leaves narrowly linear, the margins revolute, canescent-tomentose beneath; inflorescence open, the short tomentum not concealing the peduncles and pedicels; calyx 3–4 mm. long; corolla about 10 mm. long; stamens 2 cm. long.

Rocky ridges, Upper Sonoran Zone; desert slopes of the San Gabriel and San Bernardino Mountains south to the Laguna Mountains, San Diego County, California, and in adjacent Lower California to the San Pedro Martir Mountains. Type locality: Cuyamaca Mountains, California. March–July.

Rosmarinus officinalis L. Sp. Pl. 23. 1753. Rosemary. Small spreading aromatic shrub, with linear revolute-margined leaves. Native of the Mediterranean region. Frequently cultivated in the Pacific States and often seeding spontaneously.

3. *SALAZARIA* Torr. Bot. Mex. Bound. 133. pl. 39. 1859.

Shrubs with opposite, divaricate, spinescent branches, and small, entire or rarely toothed, short-petioled leaves. Flowers in the axils of the upper bract-like leaves, forming an open narrow raceme. Calyx equally 2-lobed, the lips entire, becoming inflated into a papery bladder in fruit. Corolla bilabiate, upper lip arched, lower lip broad with recurved margins, its 2 small lateral lobes attached to the base of the upper lip. Stamens 4, in two pairs, included in the upper lip. Style entire, included. Nutlets 4, tuberculate, raised on a gynobase. [Named in honor of Don José Salazar, Mexican Commissioner on the Boundary Survey.]

A monotypic genus of the arid southwestern United States and adjacent Mexico.

1. *Salazaria mexicana* Torr. Bladder Sage. Fig. 4365.

Salazaria mexicana Torr. Bot. Mex. Bound. 133. pl. 39. 1859.

Shrub 6–10 dm. high, intricately branched, the divaricate branchlets becoming spiny-tipped, pale green and minutely canescent. Leaves short-petioled, ovate or oblong-ovate, or the uppermost much-reduced and narrowly oblong, 10–25 mm. long, rounded or subcordate at base, entire or rarely toothed; flowers subsessile in the axils of the foliaceous bracts forming an interrupted raceme; calyx 6–8 mm. long in flower; corolla 12–18 mm. long, pubescent on the outer surface; fruiting calyx papery and subglobose, 16–18 mm. long.

Desert washes and canyons, Lower Sonoran Zone; Mojave and Colorado Deserts, southern California to southern Nevada, southern Utah and southwestern Texas, south to Lower California and Chihuahua. Type locality: "Ravines, Chihuahua, below Presidio del Norte, near the Rio Grande." April–June.

4. *SCUTELLARIA* [Rivin.] L. Sp. Pl. 598. 1753.

Annual or perennial herbs little or not at all aromatic, with flowers solitary or two or three together in the axils, or in bracted racemes or spikes. Calyx campanulate, gibbous, 2-lipped, the lips entire, the upper one often with a crest or protuberance on the back and often deciduous in fruit, the lower one persistent. Corolla well-exserted, bilabiate, dilated above the throat, upper lip arched, entire or emarginate, the lower spreading or deflexed, its lateral lobes small and somewhat connected with the upper lip, its middle lobe broad with the margins mostly recurved. Stamens 4, in two pairs, included in the upper lip, the upper pair 2-celled, the lower 1-celled. Style unequally 2-cleft at apex. Nutlets 4, subglobose or depressed, borne on a short or elongated gynobase. [Name Latin, meaning a salver or tray, in reference to the fruiting calyx.]

A genus of about 100 species of wide geographic distribution. Type species, *Scutellaria peregrina* L.

Flowers solitary in the axils of the leaves of the stems and branches. (*Galericularia*.)

Palate of the corolla glabrous.

Palate of the corolla distinctly pilose.

Pubescence of the stem loosely villous with rather long hairs not curved.

Flowers violet-blue throughout; nutlets distinctly muriculate; slender rootstocks terminating in distinct tubers.

Flowers white or whitish, the lower lip tinged or flecked with violet; nutlets rugose.

Pubescence of the stem of short curved hairs.

Hairs of the stem curved downward and closely appressed.

Hairs of the stem curved upward or spreading, not appressed.

Throat of the corolla completely closed by the appressed palate.

Corolla yellowish or white.

Corolla normally blue.

Throat of corolla open between the galea and lower lip.

Stems puberulent with short upwardly curved hairs (these rarely gland-tipped and spreading in *angustifolia*).

Leaves near middle of the stem narrowly ovate or elliptic, about 6 mm. wide.

Leaves near middle of stem oblong, about 4 mm. wide.

Stems with spreading glandular or eglandular hairs.

Flowers in slender, lateral, axillary, bracteate racemes; corolla blue, 5-7 mm. long; stamens filiform or nearly so.

1. *S. galericulata*.

2. *S. tuberosa*.

3. *S. Bolanderi*.

4. *S. nana*.

5. *S. californica*.

6. *S. antirrhinoides*.

7. *S. angustifolia*.

8. *S. Austiniæ*.

9. *S. siphocampyloides*.

10. *S. lateriflora*.

1. *Scutellaria galericulata* L. Marsh Skullcap. Fig. 4366.

Scutellaria galericulata L. Sp. Pl. 599. 1753.

Scutellaria epilobifolia A. Ham. Mon. Gen. Scut. 32. 1832.

Perennial herb with very slender stolons, not tuber-bearing, rather scantily puberulent; stems 2-5 dm. high, simple or with a few ascending branches. Leaves lanceolate to ovate-lanceolate, 2-5 cm. long, rather remotely crenate-serrate, cordate to subtruncate at base, short-petioled, puberulent with recurved hairs; flowers solitary in the axils of the upper leaves; pedicels 2-3 mm. long; calyx 4 mm. long; corolla blue, 15-20 mm. long, with a slender tube and only a slightly enlarged throat; nutlets light brown, rugose.

Swamps and along streams, Boreal and Transition Zones; Alaska to Newfoundland, south to California, Nebraska, and North Carolina; also Eurasia. In the Pacific States mainly east of the Cascades, extending from San Juan and Okanogan Counties, Washington, to Eldorado County, California. Type locality: Europe. June-Sept.

2. *Scutellaria tuberosa* Benth. Dannie's Skullcap. Fig. 4367.

Scutellaria tuberosa Benth. Lab. Gen. & Sp. 441. 1834.

Scutellaria pilosiuscula Nutt. ex Benth. in A. DC. Prod. 12: 429. 1848.

Perennial with creeping tuber-bearing rhizomes; stems slender or weak and sometimes trailing, 5-30 cm. high, pubescent to nearly glabrous. Leaves thin, ovate, usually not over 2 cm. long, obtuse to rounded at apex, truncate or narrowed at base, remotely crenate to nearly entire, thinly pilose on both surfaces; petioles slender, 5-15 mm. long; flowers few, short-pedicelled; calyx 3-5 mm. long, densely villous; corolla blue, 15 mm. long, 5-6 mm. wide at throat; upper lip smaller than the lower, entire; lower lip spreading, 3-lobed, the middle lobe emarginate; nutlets black, strongly muriculate.

Open woods, Upper Sonoran and Transition Zones; Josephine and Jackson Counties, southern Oregon, to northern Lower California. Type locality: California. March-July.

3. *Scutellaria Bolanderi* A. Gray. Bolander's Skullcap. Fig. 4368.

Scutellaria Bolanderi A. Gray, Proc. Amer. Acad. 7: 387. 1868.

Perennial with slender rootstocks; stems simple or branched, 2-4 dm. high, erect or ascending or sometimes weak and reclining, rather sparsely short-pubescent. Leaves thin, spreading, ovate to ovate-oblong, 15-35 mm. long, rounded or subcordate at base, obtuse at apex, short-petioled, more or less remotely crenate-serrate, or those on the branchlets often reduced and entire, sparsely pubescent; flowers usually few, in the upper axils; pedicels slender, 1-2 mm. long, pubescent and more or less glandular; calyx light green, 3-4 mm. long, pubescent; corolla white, 16-18 mm. long, tube rather abruptly expanding into the throat, upper lip much smaller than the lower, undulate, the lower shallowly 3-lobed, purple-dotted; nutlets rugose, 1 mm. long.

Moist gravelly slopes or meadows, Arid Transition and Upper Sonoran Zones; Sierra Nevada from Plumas County to Tulare County, California; also an isolated locality (Uvas Creek, Santa Clara County) in the Coast Ranges. Type locality: Clark's Meadows, Mariposa County, California. May-Aug.

Scutellaria Bolanderi subsp. *austromontana* Epling, Madroño 5: 58. 1939. Corolla 12-15 mm. long, lower lip not purple-dotted. Mojave River at Victorville, San Bernardino County, southward in the San Bernardino, San Jacinto, Cuyamaca and Palomar Mountains, California. Type locality: along Carrizo Creek, near Lake Henshaw, San Diego County.

4. *Scutellaria nana* A. Gray. Dwarf Skullcap. Fig. 4369.

Scutellaria nana A. Gray, Proc. Amer. Acad. 11: 100. 1876.

Plants with very slender tuberous offshoots from the rootstocks; stems usually much-branched, 4-8 cm. high. Leaves crowded, ovate to spatulate, narrowed from near the middle to



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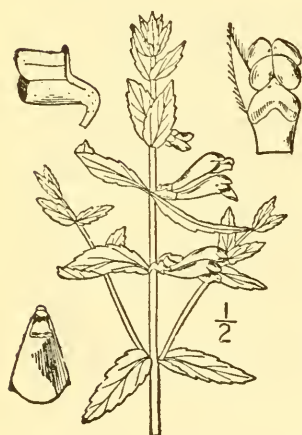
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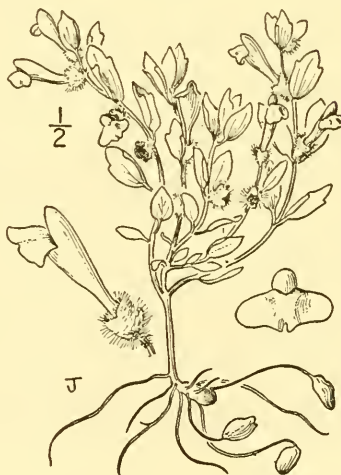
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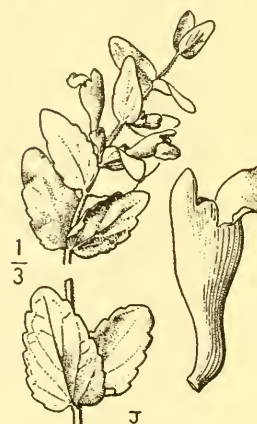
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4360. *Trichostema laxum*4361. *Trichostema lanceolatum*4362. *Trichostema ovatum*4363. *Trichostema lanatum*4364. *Trichostema Parishii*4365. *Salazaria mexicana*4366. *Scutellaria galericulata*4367. *Scutellaria tuberosa*4368. *Scutellaria Bolanderi*

the short petiole, 10–15 mm. long, entire, thickish, nearly veinless, canescent with a minute tomentulose puberulence; calyx often purplish, 5–6 mm. long; corolla white, often tinged with yellow or rose, densely puberulent without, 12–15 mm. long, throat rather abruptly dilated, lips about equal in length.

Dry usually sandy soils, Upper Sonoran and Arid Transition Zones; Deschutes and Crook Counties, eastern Oregon, to Siskiyou and Plumas Counties, California, also to central Nevada. Type locality: "in Winnemucca Valley, near Pyramid Lake," Nevada. June–Aug.

5. *Scutellaria californica* A. Gray. California Skullcap. Fig. 4370.

Scutellaria antirrhinoides var. *californica* A. Gray, Proc. Amer. Acad. 8: 396. 1872.

Scutellaria californica A. Gray, Syn. Fl. N. Amer. 2¹: 381. 1878.

Plants with slender rootstocks and erect simple or branched stems 1–3 dm. high, puberulent or minutely tomentose and more or less glandular. Leaves narrowly linear-oblong to oblong-ovate, narrowed at base to a short petiole, rounded at apex, 15–25 mm. long, entire or the lower often few-toothed, puberulent with curved hairs; flowers in the upper axils; pedicels slender, about 3 mm. long; calyx pale green, 4 mm. long, puberulent; corolla white, more or less tinged with yellow, 15–20 mm. long, the throat ampliate, lips about equal in length, the lower villous on the inner surface; nutlets rugose.

Dry usually gravelly soils, Arid Transition and Upper Sonoran Zones; California Coast Ranges from Humboldt and Trinity Counties to Alameda County, and in the Sierra Nevada from Tehama County to Eldorado County. Type locality: Anderson Valley, California. Originally based upon several collections, but Bolander's specimen from Anderson Valley is the lectotype (Epling, Univ. Calif. Pub. Bot. 20: 31. 1942).

6. *Scutellaria antirrhinoides* Benth. Snapdragon Skullcap. Fig. 4371.

Scutellaria antirrhinoides Benth. Bot. Reg. 18: under pl. 1493. 1832.

Scutellaria sanhedrinsis Heller, Muhlenbergia 1: 31. 1904.

Scutellaria viarum Heller, op. cit. 32.

Scutellaria antirrhinoides var. *sanhedrensis* Leonard, Contr. U.S. Nat. Herb. 22: 732. 1927.

Perennial with slightly and uniformly thickened rootstock; stems erect or ascending, simple or diffusely branched, puberulent and sometimes slightly glandular. Leaves oblong-ovate to oblong-elliptic, 1–2 cm. long, entire, obtuse at apex, narrowed at base, sessile or short-petioled, puberulent on both surfaces and somewhat canescent; pedicels puberulent, 3–5 mm. long; calyx purplish, puberulent, 3–4 mm. long; corolla blue with white markings, 1–1.5 cm. long, about 2 mm. broad at base of tube and about 6 mm. at throat; lips about equal in length with entire lobes; nutlets black, tuberculate.

Usually on moist rocky slopes and banks, Transition Zones; Willamette Valley and Grant County, Oregon, to Sonoma and Amador Counties, California, east to southern Idaho and central Nevada. Type locality: on the Columbia River, near Fort Vancouver. Collected by Scouler. May–Sept.

7. *Scutellaria angustifolia* Pursh. Narrow-leaved Skullcap. Fig. 4372.

Scutellaria angustifolia Pursh, Fl. Amer. Sept. 412. 1814.

Scutellaria veronicifolia Rydb. Bull. Torrey Club 36: 681. 1909.

Perennial with rootstocks often producing tuberous stolons; stems simple or branched below, 1–3 dm. high; herbage puberulent with minute curved hairs, not glandular. Leaves linear-oblong to oblong-ovate, entire, 1–4 cm. long, narrowed at base to a short petiole, rounded at apex; flowers in the upper axils; pedicels slender, 4–6 mm. long, these and the calyx minutely puberulent; corolla blue-purple, 20–25 mm. long, upper lip notched at apex equaling or slightly exceeding the lower, tube slender, rather abruptly dilated above into the throat; nutlets glandular.

Moist places, Arid Transition Zone; Chelan and Whitman Counties, eastern Washington to British Columbia and northern Idaho, south to Lane, Crook, and Baker Counties, Oregon. Type locality: "On the river Kooskoosky," near Kamiah, Idaho. June–July.

8. *Scutellaria Austiniae* Eastw. Austin's Skullcap. Fig. 4373.

Scutellaria Austiniae Eastw. Bull. Torrey Club 30: 493. 1903.

Scutellaria linearifolia Eastw. loc. cit.

Scutellaria angustifolia var. *Austiniae* Leonard, Contr. U.S. Nat. Herb. 22: 726. 1927.

Perennial with slender branching more or less woody rootstocks, seldom if ever producing tubers; stems simple or branched below, 10–25 cm. high; herbage puberulent with minute curved hairs, not glandular. Leaves ascending, oblong-lanceolate to oblong-linear, 15–25 mm. long, rounded at apex, narrowed at base to a short slender petiole; flowers in the upper axils; pedicels slender, 3–4 mm. long; calyx puberulent, not glandular; corolla blue-purple, 20–25 mm. long, sparingly glandular-pubescent on the outer surface, erect, the slender tube curved upward; upper lip distinctly longer than the lower.

Gravelly or rocky soils, Arid Transition Zone; Shasta County, south in the Coast Ranges to Lake County and the Sierra Nevada to the San Jacinto Mountains, southern California. Type locality: Big Chico Creek, Butte County, California. May–July.

9. *Scutellaria siphocampyloides* Vatke. Gray-leaved Skullcap. Fig. 4374.

Scutellaria siphocampyloides Vatke, Bot. Zeit. 30: 717. 1872.

Scutellaria angustifolia var. *canescens* A. Gray, Bot. Calif. 1: 603. 1876.

Perennial with slender branching rootstocks; stems simple or branched near the base, 1–3 dm.

high; herbage densely glandular-pubescent. Leaves linear-oblong, 15–25 mm. long, obtuse above, narrowed below to a sessile or subsessile base, entire or rarely few-toothed; flowers often borne in most of the axils; pedicels and calyx glandular-pubescent; corolla blue-purple, glandular-pubescent on the outer surface, 25–30 mm. long, upper lip notched at apex, distinctly longer than the lower; nutlets granular.

Gravelly soils, Upper Sonoran and Transition Zones; Inner Coast Ranges of central California and in the Sierra Nevada from Butte County to Tulare County. Type locality: "Hab. in California (Bridges 226)." May–July.

10. *Scutellaria lateriflora* L. Mad-dog or Blue Skullcap. Fig. 4375.

Scutellaria lateriflora L. Sp. Pl. 598. 1753.

Perennial with slender stolons, entirely glabrous or puberulent above; stems simple or branched, erect or ascending, leafy, 2–15 dm. high. Leaves thin, ovate to ovate-oblong or ovate-lanceolate, 3–7 cm. long, becoming smaller above, slender-petioled, acute or acuminate at apex, obtuse to subcordate at base, coarsely serrate-dentate; racemes axillary, also sometimes terminal, slender, secund, several to many-flowered; corolla blue varying to white, 6–10 mm. long, the lips short, about equal; nutlets smooth, borne on a very short gynobase.

Low moist places, Boreal and Transition Zones; British Columbia, western Washington and Oregon, also San Joaquin and Inyo Counties, California, east to Newfoundland, Florida and New Mexico. Type locality: "Canada, Virginia." July–Sept.

5. *MARRUBIUM* [Tourn.] L. Sp. Pl. 582. 1753.

Perennial, mostly woolly herbs, with bitter juice and petioled, toothed, rugose leaves. Flowers small, white or purple, in dense axillary clusters. Calyx cylindric, 5–10-nerved, regularly 5–10-toothed, the teeth acute or aristate, spreading or recurved, nearly equal or the alternating ones smaller. Corolla 2-lipped, upper lip erect, entire or emarginate, lower spreading, 3-cleft, its middle lobe often emarginate. Stamens 4, included, didynamous, the posterior pair shorter; anthers 2-celled. Styles cleft into 2 short lobes at summit; ovary deeply 4-lobed. Nutlets ovoid, smooth. [Name Hebrew, meaning bitter.]

A genus of about 40 species, all natives of the Old World. Type species, *Marrubium vulgare* L.

1. *Marrubium vulgare* L. Common Hoarhound. Fig. 4376.

Marrubium vulgare L. Sp. Pl. 583. 1753.

Perennial herb with stout erect or ascending branches, 3–10 dm. high, white-woolly, especially below. Leaves oval to broadly ovate or suborbicular, 2.5–5 cm. long, crenate-dentate, rugose-veined, obtuse to rounded at apex, narrowed to subcordate at base, woolly beneath, canescent above; petioles 1–2 cm. long; flowers in dense axillary clusters, whitish; calyx-teeth usually 10, subulate, more or less recurved.

Roadsides and waste places, Arid Transition and Sonoran Zones; British Columbia to southern California and across the continent. Native of Europe and Asia. April–Aug.

6. *AGASTACHE* Clayton ex Gronov. Fl. Virg. 88. 1762.

Erect herbs with perennial rootstocks, serrate-petioled leaves and small flowers in dense verticillate clusters forming compact or interrupted terminal bracted spikes. Calyx campanulate, somewhat oblique, usually 15-nerved, slightly 2-lipped, the upper lip with 2, the lower with 3 approximately equal teeth. Corolla-tube not exceeding the calyx, the limb conspicuously 2-lipped, the upper lip erect, 2-lobed, the lower spreading, 3-lobed with the middle lobe crenate. Stamens 4, all fertile, exserted, divergent or distant, the upper pair usually declined, the lower shorter and ascending; anther-cells parallel or nearly so, both fertile. Style 2-cleft at summit; ovary deeply 4-parted. Nutlets ovoid, smooth. [Name Greek, meaning many spikes.]

A North American genus of about 8 species. Type species, *Hyssopus scrophulariaefolius* Willd.

Lower surface of leaves glabrous or if puberulent only thinly so, at least not felt-like.

Leaves mainly 3–4 cm. broad; calyx-teeth deltoid-lanceolate, 2.5–3.5 mm. long.

1. *A. urticifolia*.

Leaves mainly 1–1.5 cm. broad; calyx-teeth deltoid-lanceolate, 4.5–5.5 mm. long.

2. *A. Cusickii*.

Lower surface of leaves canescent or hoary with a dense felt-like tomentulose pubescence.

Leaves mainly 1–1.5 cm. broad, margins plane not inrolled; calyx-teeth narrowly deltoid-subulate.

3. *A. parvifolia*.

Leaves mainly 2–4 cm. broad, margins narrowly inrolled; calyx-lobes deltoid-lanceolate.

4. *A. occidentalis*.

1. *Agastache urticifolia* (Benth.) Kuntze. Nettle-leaved Horse-mint. Fig. 4377.

Lophanthus urticifolius Benth. Bot. Reg. 15: under pl. 1282. 1829.

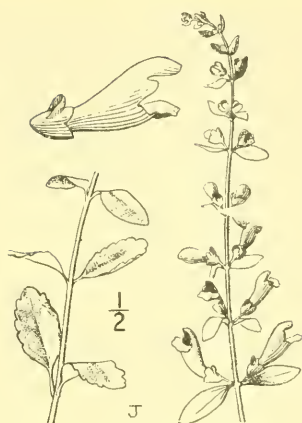
Agastache urticifolia Kuntze, Rev. Gen. Pl. 2: 511. 1891.

Agastache glaucifolia Heller, Muhlenbergia 1: 32. 1904.

Stems several from the base, 1–2 m. high, branched above, glabrous or nearly so. Leaves ovate or deltoid-ovate, the median 3.5–8 cm. long, obtuse to acute or often acuminate at apex, truncate or subcordate at base, or rarely cordate at base, coarsely serrate, upper surface mostly glabrous and often shiny, sometimes minutely puberulent, lower surface paler, glabrous or pu-



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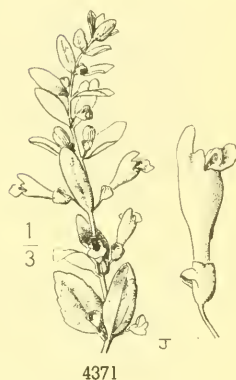
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4369. *Scutellaria nana*
 4370. *Scutellaria californica*
 4371. *Scutellaria antirrhinoides*

4372. *Scutellaria angustifolia*
 4373. *Scutellaria Austiniae*
 4374. *Scutellaria siphocampyloides*

4375. *Scutellaria lateriflora*
 4376. *Marrubium vulgare*
 4377. *Agastache urticifolia*

berulent; inflorescence compact, 4–15 cm. long, tapering, lower verticils sometimes remote; bracts ovate to lanceolate, acuminate; calyx puberulent to nearly glabrous, the tube greenish, 4–7 mm. long, the lobes deltoid-subulate, membranous and usually rose-colored, 2.5–5 mm. long; corolla rose-colored or violet, the tube 8–12 mm. long; nutlets 1.5–2 mm. long.

Moist soils, Canadian and Transition Zones; southeastern British Columbia southeast of the Cascades from Okanogan and Spokane Counties, Washington, to southern Oregon, then extending west over the Cascades to Jackson County, Oregon, and southward through the California Coast Ranges and Sierra Nevada to the San Jacinto Mountains, southern California. The California Coast Ranges plants are generally more pubescent, but intergradation is complete especially in the northern Sierra Nevada. Type locality: "the north-west coast of America." Collected by Douglas. June–Aug.

2. *Agastache Cusickii* (Greenm.) Heller. Cusick's Agastache. Fig. 4378.

Lophanthus Cusickii Greenm. Erythea 7: 119. 1899.

Agastache Cusickii Heller, Muhlbergia 1: 59. 1904.

Much-branched suffrutescent perennial, 15–30 cm. high, puberulent throughout with short spreading whitish hairs. Leaves broadly ovate to rather narrowly triangular-ovate, 1–2 cm. long, unevenly crenate-serrate, obtuse or acute, rather abruptly narrowed to the petiole, this equaling or shorter than the blade; spikes terminal, densely flowered, 2–3 cm. long in anthesis; calyx about 1 cm. long, the teeth about as long as the tube, narrowly lanceolate, attenuate, purplish or whitish; corolla-lobes often pubescent on the inner surface; anthers purple.

Rocky summits and slopes, Upper Sonoran and Arid Transition Zones, Steen Mountains, Oregon. Type locality: Steen Mountains. June–Aug.

3. *Agastache parvifolia* Eastw. Small-leaved Agastache. Fig. 4379.

Agastache parvifolia Eastw. Leaflets West. Bot. 2: 284. 1940.

Stems slender, less than 1 m. high, branching, minutely and rather thinly puberulent. Leaves deltoid or sometimes deltoid-ovate, rather firm, the median 2–3.5 cm. long, acute or somewhat acuminate at apex, truncate or slightly cordate at base, coarsely serrate, upper surface rather pale green, minutely puberulent, lower surface microscopically tomentulose; petioles slender; inflorescence compact, tapering; bracts ovate-lanceolate to lanceolate-acuminate; calyx rose-colored, minutely puberulent, tube 5–6 mm. long, teeth lanceolate-subulate, 4–7 mm. long; corolla-tube about 10 mm. long; nutlets 1.5–1.8 mm. long.

Mostly on lava rocks, Upper Sonoran and Arid Transition Zones; Siskiyou, Modoc, and Shasta Counties, California. Type locality: "Lava Beds National Monuments, near Schonchin Butte, Siskiyou Co." June–Aug.

4. *Agastache occidentalis* (Piper) Heller. Western Horse-mint. Fig. 4380.

Vleckia occidentalis Piper, Erythea 6: 31. 1898.

Agastache occidentalis Heller, Muhlbergia 1: 4. 1900.

Lophanthus occidentalis K. Schum. Bot. Jahresb. 26: 387. 1900.

Stems mostly simple or sparingly branched, a meter or usually less in height, minutely puberulent to glabrate. Leaves ovate to deltoid-ovate, the median 3–6 cm. long, usually acuminate at apex, truncate or subcordate at base, crenate-serrate with the margins narrowly inrolled, upper surface glabrous or sometimes minutely puberulent, somewhat glossy, under surface densely tomentulose and hoary or canescent; bracts ovate to lanceolate, acuminate; calyx violet or rose, subglabrous or thinly hirtellous, the tube 4–7 mm. long, the teeth 2–7 mm. long, acute; corolla-tube 3–12 mm. long; nutlets 1.5–2 mm. long, the apical bristles stiff.

Rocky canyon slopes, Arid Transition Zone; eastern slopes and base of the Cascades, Washington, from Chelan County to Yakima County. Type locality: 6 miles northwest of Ellensburg, Washington. June–Aug.

Cedronella canariensis (L.) Willd. ex Webb & Berth. Phyt. Canar. 3: 87. 1836–1850. (*Dracocephalum canariense* L. Sp. Pl. 594. 1753.) Herb-of-Gilead. Fragrant half-shrub, about 1 m. high, woody at base. Leaves trifoliate; leaflets oblong to lanceolate, serrate, 2.5–8 cm. long, pubescent beneath, glabrate above; spikes oblong; calyx pubescent, the teeth lanceolate-acuminate, 3-ribbed; corolla violet or white, 18–20 mm. long. Cultivated as an ornamental, adventive in San Francisco, California. Native of the Canary Islands.

7. NÉPETA [Rivin.] L. Sp. Pl. 570. 1753.

Herbs with toothed leaves and usually white or blue flowers in verticillate clusters, forming terminal spikes or sometimes axillary and cymose. Calyx cylindric, slightly oblique at the apex, 15-nerved, 5-toothed and obscurely 2-lipped, the upper teeth usually longer. Corolla enlarged above, strongly 2-lipped, upper lip erect, emarginate or 2-lobed, the lower lip spreading, 3-lobed with the middle lobe larger than the lateral ones. Stamens 4, all fertile, didynamous, ascending under the upper lip; anther-sacs 2, divergent. Ovary deeply 4-parted; style 2-cleft at summit. Nutlets ovoid, compressed, smooth. [Ancient Latin name of Catnip.]

A genus of about 150 species, native of Europe and Asia. Type species, *Nepeta Cataria* L.

1. *Nepeta Cataria* L. Catnip or Catmint. Fig. 4381.

Nepeta Cataria L. Sp. Pl. 570. 1753.

Perennial, with pale green and densely canescent herbage; stems erect, 5–10 dm. high, branches ascending. Leaves ovate to oblong, petioled, acute at apex, usually cordate at base, coarsely crenate-serrate; flower-verticils in the axis of small foliaceous bracts forming dense or

interrupted terminal spikes; bractlets subulate; calyx about 6 mm. long, the subulate teeth about half as long as the tube, short-pubescent on the prominent nerves; corolla white to pale purple, dotted with dark purple, 10–12 mm. long, puberulent on the outer surface, the broad middle lobe of the lower lip crenulate.

Usually in waste places, mainly in the Transition Zones; Washington to southern California and across the continent. Naturalized from Europe. July–Nov.

8. GLECÒMA L. Sp. Pl. 578. 1753.

Low usually creeping herbs, with long-petioled rounded or reniform leaves and rather large blue or blue-purple flowers in verticillate clusters. Calyx oblong-tubular, 15-nerved, oblique at throat and unequally 5-toothed. Corolla-tube exserted, enlarged above, limb 2-lipped, upper lip erect, emarginate or 2-lobed, lower lip spreading, 3-lobed, its middle lobe broad and emarginate, the lateral ones small. Stamens 4, didynamous, the lower pair shorter, all anther-bearing, ascending under the upper lip and exserted; anther-sacs divergent. Ovary deeply 4-parted. Nutlets ovoid, smooth. [Name Greek, meaning thyme or pennyroyal.]

A genus of 6 species, native of Europe and Asia. Type species, *Glechoma hederacea* L.

1. *Glechoma hederacea* L. Ground Ivy. Fig. 4382.

Glechoma hederacea L. Sp. Pl. 578. 1753.

Nepeta Glechoma Benth. Lab. Gen. & Sp. 485. 1834.

Nepeta hederacea Trev. Prosp. Fl. Eug. 26. 1842.

Perennial, stems creeping with slender ascending branches, 1–5 dm. long, bright green, retrorsely puberulent. Leaves suborbicular and deeply cordate at base, coarsely but rather shallowly crenate, 1–2.5 cm. broad, bright green on both surfaces, glandular-punctate, long-petioled; flowers few or solitary in the axils, short-pedicelled; calyx 5–6 mm. long, puberulent without; upper pair of stamens much longer than the lower.

Moist, especially partly shaded places, mainly Transition Zones; western Washington to central California; also in the Rocky Mountains, northern Mississippi Valley and North Atlantic States. Naturalized from Europe. March–May.

9. MOLDÁVICA [Tourn.] Adans. Fam. Pl. 2: 190. 1763.

Herbs with entire, toothed or incised leaves, and blue or purple flowers subtended by pectinate bracts in terminal or axillary clusters. Calyx tubular, 15-nerved, 5-toothed, with the upper tooth much longer than the others, or 2-lipped with the 3 upper teeth more or less united. Corolla 2-lipped, upper lip erect, emarginate, the lower spreading, 3-lobed, with the middle lobe larger than the lateral ones and sometimes 2-cleft. Stamens 4, didynamous, ascending under the upper lip, upper pair longer than the lower; anther-sacs divaricate. Style 2-cleft at summit; ovary deeply 4-lobed. Nutlets ovoid, smooth. [Name from Moldavia.]

A genus of about 35 species, native of the northern hemisphere. The following is the only native in North America. Type species, *Dracocephalum Moldavica* L.

1. *Moldavica parviflora* (Nutt.) Britt. American Dragon-head. Fig. 4383.

Dracocephalum parviflorum Nutt. Gen. 2: 35. 1818.

Moldavica parviflora Britt. in Britt. & Brown, Ill. Fl. ed. 2. 3: 114. 1913.

Annual or biennial herb, glabrous or often pubescent especially above; stems erect, simple or few-branched above, or several from the root crown, 2–8 dm. high. Leaves lanceolate to ovate or oblong, 2.5–6 cm. long, coarsely aristate-serrate or -incised, acute or obtuse, narrowed to a slender petiole at base; flower clusters crowded into narrow dense terminal spikes, and often also in the upper leaf axils; bracts ovate to oblong, their teeth awn-pointed; calyx 12–15 mm. long, the teeth acuminate, upper one ovate-oblong, the others narrower and shorter; corolla light blue, but little exceeding the calyx, villous on the outer surface.

Mostly in gravelly soil, Transition and Canadian Zones; widely spread over North America; in the Pacific States ranging from Okanagan County, Washington, to the Blue Mountains and Lake County, Oregon. Type locality: "Around Fort Mandan, on the Missouri." June–Aug.

10. PRUNÉLLA L. Sp. Pl. 600. 1753.

Perennial herbs with slender rootstocks, petioled leaves, and rather small flowers in terminal and also sometimes axillary dense bracted spikes or heads. Calyx usually 10-nerved, deeply 2-lipped, upper lip truncate or with 3 short teeth, lower cleft into 2 lanceolate teeth. Corolla strongly 2-lipped, upper lip arched, lower spreading and 3-lobed. Stamens 4, didynamous, ascending under the upper lip, the lower pair longer; filaments 2-toothed at apex, one of the teeth bearing the anther, the other sterile; anther-cells 2, divergent. Ovary deeply 4-parted. Nutlets ovoid, smooth. [Origin of the name doubtful, the pre-Linnean form was *Brunella*.]

A genus of about 5 species of world-wide distribution, the following the only one occurring in North America. Type species, *Prunella vulgaris* L.

1. *Prunella vulgaris* subsp. *lanceolata* (Barton) Hultén. Heal-all or Self-heal.

Fig. 4384.

Prunella pennsylvanica β *lanceolata* Barton, Fl. Phil. 2: 37. 1818.*Prunella vulgaris* β *major* Hook. Fl. Bor. Amer. 2: 114. 1840.*Prunella vulgaris* var. *lanceolata* Fernald, Rhodora 15: 183. 1913.*Prunella vulgaris* subsp. *lanceolata* Hultén, Fl. Aleut. Isl. 286. 1937.

Stems erect or decumbent at base, usually simple, 1–6 dm. high, glabrous or commonly pilose especially above. Leaves ovate-lanceolate to oblong-lanceolate, often 3–5 cm. long, acute or acutish or sometimes rounded at apex, narrowed to a short or elongated petiole, entire or irregularly and remotely toothed; spikes terminal, 2–5 cm. long; bracts orbicular or broadly ovate, cuspidate, more or less ciliate, green or often tinged with purple; calyx about half as long as the corolla, the teeth often ciliate; corolla 10–20 mm. long, violet or rarely white.

Open woods, Boreal and Transition Zones; widely distributed over North America and variable in habit and size of flower. Several color forms and varieties have been proposed. In the Pacific States it ranges from Washington to the mountains of southern California and northern Lower California.

Prunella vulgaris L. Sp. Pl. 600. 1753. Stems creeping forming mats, leaves smaller, mostly obtuse at apex, and usually rounded at base; flowers 3–10 mm. long. The typical species, native of Europe, is a frequent weed in lawns, especially in western Washington, Oregon, and central California.

11. *DRACOCÉPHALUM* [Tourn.] L. Sp. Pl. 594. 1753.

Glabrous or puberulent herbs with erect stems and toothed or entire leaves. Flowers rather conspicuous, in terminal bracted spikes or spikelike racemes. Calyx campanulate or oblong, swollen in fruit, membranous, 10-nerved, equally 5-toothed. Corolla well-exceeding the calyx, purple, pink or white, 2-lipped; upper lip rounded, entire or nearly so, concave; lower lip spreading, 3-lobed, the middle lobe emarginate; tube gradually enlarged upward. Stamens 4, didynamous, ascending under the upper lip, the lower pair the longer; filaments pubescent; anther-sacs 2, nearly parallel. Ovary 4-parted. Nutlets ovoid-triangular, smooth. [Name Greek, meaning dragon-head.]

A genus of about 7 species, natives of North America. Type species, *Dracocephalum virginianum* L.

1. *Dracocephalum Nuttallii* Britt. Purple or Western Dragon Head. Fig. 4385.

Physostegia parviflora Nutt. ex Benth. in A. DC. Prod. 12: 434, as a synonym. 1848; A. Gray, Proc. Amer. Acad. 8: 371. 1872. Not *Dracocephalum parviflorum* Nutt.

Dracocephalum Nuttallii Britt. Ill. Fl. ed. 2. 3: 117. 1913.

Stem erect, 3–10 dm. high, usually simple and rather short, glabrous. Leaves 4–10 cm. long, lanceolate to ovate-lanceolate, acuminate, sharply serrate or dentate, narrowed below to a sessile base on the lowest petiole; spikes several to many-flowered, 2–10 cm. long; bracts shorter than the calyx, ovate to broadly lanceolate; calyx campanulate, 4–5 mm. long, teeth barely over 1 mm. long; corolla purple, 10–14 mm. long.

In moist soil, mainly Transition Zones; British Columbia to Sauvie Island, Oregon, east to Saskatchewan, also to Idaho, Montana, Wisconsin, and Nebraska. Type locality: "Oregon." Collected by Nuttall.

Leonotis Leonurus (L.) R. Br. in Ait. Hort. Kew. 3: 410. 1811. (*Phlomis Leonurus* L. Sp. Pl. 587. 1753.) Lion's Ear. Suffrutescent, 1–2 m. high. Leaves lanceolate, 4–6 cm. long, coarsely serrate; flowers in dense axillary whorls; calyx funneliform, the tube arched, teeth 5, subequal, awn-pointed; corolla orange-colored, 3.5–4 cm. long, enlarged in the throat, densely pilose without; upper lip much longer than the lower. An occasional escape from gardens in California. June–Sept.

Phlomis fruticosa L. Sp. Pl. 584. 1753. Jerusalem Sage. Shrub 6–15 dm. high, divaricately branched, yellowish-tomentose. Leaves ovate to oblong, pale green and stellate-pubescent above, white-tomentose and rugose beneath; flowers in 1 or 2 verticils at the ends of the branches; calyx-tube 15 mm. long, its teeth short, cuspidate; corolla yellow, about 25 mm. long, densely stellate-pubescent, upper lip strongly arched, the lower spreading. Occasionally escaped from cultivation in central and southern California.

12. *LAMIUM* [Tourn.] L. Sp. Pl. 579. 1753.

Annual or perennial herbs, with toothed or incised cordate leaves, and small flowers verticillate in axillary and terminal clusters. Calyx tubular-campanulate, usually 5-nerved, 5-toothed, the teeth sharp-pointed, equal or the upper longer. Corolla-tube dilated above, usually longer than the calyx, the limb 2-lipped; upper lip concave, erect, usually entire; lower lip spreading, 3-lobed, the middle lobe emarginate and contracted at base, the lateral lobes often with a lateral appendage. Stamens 4, didynamous, anterior pair the longer; anthers 2-celled, the sacs divaricate often hirsute on the back. Style 2-cleft at apex; ovary 4-parted. Nutlets smooth or tuberculate. [Name Greek, meaning throat, from the ringent corolla.]

An Old World genus of about 40 species. Type species, *Lamium purpureum* L.

Upper leaves sessile or clasping.

Leaves all petioled.

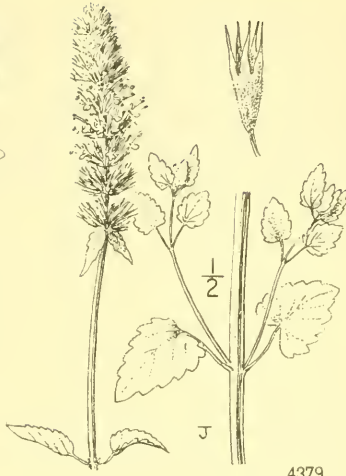
Corolla not over 15 mm. long; plants annual; upper leaves purple-tinged, not blotched.

Corolla 20–25 mm. long; plants perennial; leaves usually with an elongated whitish blotch.

1. *L. amplexicaule*.2. *L. purpureum*.3. *L. maculatum*.



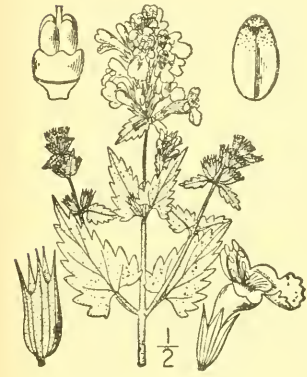
4378



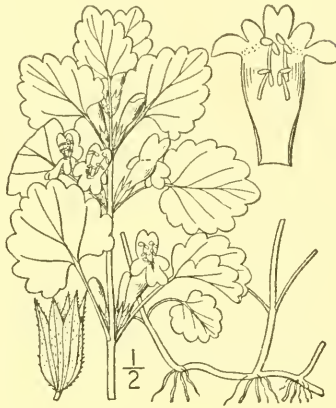
4379



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4378. *Agastache Cusickii*
 4379. *Agastache parvifolia*
 4380. *Agastache occidentalis*

4381. *Nepeta Cataria*
 4382. *Glecoma hederacea*
 4383. *Moldavica parviflora*

4384. *Prunella vulgaris*
 4385. *Dracocephalum Nuttallii*
 4386. *Lamium amplexicaule*

1. *Lamium amplexicaule* L. Common Henbit or Dead Nettle. Fig. 4386.*Lamium amplexicaule* L. Sp. Pl. 579. 1753.

Annual or biennial, sparsely pubescent; stems branched from the base and often from the lower axils, ascending or decumbent, 1.5–4.5 cm. long. Leaves broadly ovate to nearly orbicular, truncate or cordate at base, coarsely crenate, the basal slender-petioled, 7–10 mm. broad; the upper sessile or clasping, 20–25 mm. wide; flowers relatively few in axillary and terminal clusters; calyx pubescent, the teeth nearly as long as the tube, erect; corolla purple or red, 12–16 mm. long, tube very slender; lower lip with very small lateral lobes, its middle lobe spotted; upper lip pubescent with reddish hairs.

Frequent in cultivated grasses and waste places, naturalized from Europe; British Columbia to southern California. Feb.–Oct.

2. *Lamium purpureum* L. Red Henbit or Dead Nettle. Fig. 4387.*Lamium purpureum* L. Sp. Pl. 579. 1753.

Annual, sparsely pubescent; stems branched from the base and sometimes from the axils, decumbent, 15–45 cm. long. Leaves crenate or crenulate, the lower slender-petioled, orbicular to broadly ovate, 8–12 mm. long, cordate at base, rounded at apex, the upper short-petioled, ovate and usually acutish at apex, cordate at base, 15–25 mm. long; corolla purple-red, 10–16 mm. long, the tube rather stout, lateral lobes of the linear lip reduced to short teeth, the middle one spotted, upper lip densely reddish-pubescent.

Waste places and cultivated ground, naturalized from Europe; Washington to central California. Not as common as the preceding. March–Oct.

3. *Lamium maculatum* L. Spotted Henbit or Dead Nettle. Fig. 4388.*Lamium maculatum* L. Sp. Pl. ed. 2. 809. 1763.

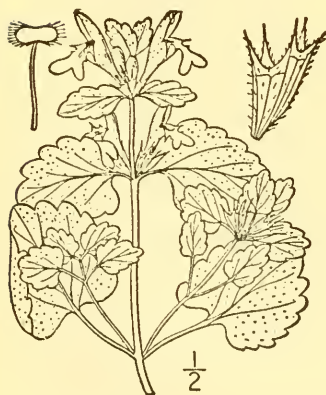
Perennial herb, sparsely pubescent; stems commonly branched, decumbent or ascending, 2–5 dm. long. Leaves crenate, all petioled, usually with a blotch along the midrib, broadly ovate, acute or obtuse at apex, cordate or truncate at base, 2–5 cm. long, the basal smaller, rounded, and slender-petioled; flowers mainly axillary; corolla purple-red, 20–25 mm. long, tube short, contracted near the base with a transverse ring of hairs within, rather short-pubescent all over the outer surface.

An occasional escape from gardens, in the Willamette Valley, Oregon; also in the Atlantic States. Native of Europe. April–Oct.

Moluccella laevis L. Sp. Pl. 587. 1753. Shell-flower. Annual, glabrous, the stems erect, simple or branched, 4–8 dm. high. Leaves suborbicular, coarsely toothed with broad rounded teeth, petiole slender about equaling the blades; flowers several in the axils of the leaves, subtended by several slender spreading or reflexed spines; calyx-lobes united into a broad funnelform membranous reticulate-veined structure simulating a morning-glory, subtended by several spines; corolla included, white or pink, the upper lip arched and including the stamens. An occasional escape from gardens in southern Oregon and central California. Native of western Asia.

13. *STACHYS* [Tourn.] L. Sp. Pl. 580. 1753.

Annual or perennial, commonly pubescent or hispid herbs, with mostly purplish verticillate flowers, forming dense or interrupted terminal spikes, or also in the upper axils. Calyx usually companulate, 5–10-nerved, 5-toothed, the teeth nearly equal, erect or spread-



4387

4387. *Lamium purpureum*

4388

4388. *Lamium maculatum*

4389

4389. *Stachys arvensis*

ing. Corolla-tube narrow, not dilated at the throat, strongly 2-lipped; upper lip erect, concave, entire or emarginate; lower lip spreading, 3-lobed, middle lobe broader than the often deflexed lateral ones, sometimes 2-lobed. Stamens 4, didynamous, ascending under the upper lip, the anterior pair the longer; anthers contiguous in pairs, the sacs divergent. Ovary deeply 4-lobed; style 2-cleft, the lobes subulate. Nutlets ovoid or oblong. [Name Greek, meaning spike, in reference to the spicate inflorescence.]

About 170 species of wide geographical distribution in the North Temperate Zone, a few in South America and South Africa. Type species, *Stachys germanica* L.

Annual.

1. *S. arvensis*.

Perennial, usually with creeping rootstocks.

Ring of hairs on inner surface of corolla-tube not indicated on the outer surface by a constriction (sometimes slightly so in *S. Emersonii*).

Ring of hairs within the corolla-tube horizontal and near the base of the tube; corolla reddish purple.

2. *S. bullata*.

Ring of hairs within the corolla-tube oblique or horizontal and near the middle of the tube.

Corolla reddish purple, the tube 15-25 mm. long.

Calyx 11-15 mm. long; inflorescence densely villous-tomentose.

3. *S. Chamissonis*.

Calyx 7-10 mm. long; inflorescence rather thinly pubescent or with few scattering hairs.

4. *S. ciliata*.

Corolla purplish, the lower lip mottled with white; rings of hairs within the corolla-tube sometimes indicated without by a slight constriction.

5. *S. Emersonii*.

Ring of hairs on the inner surface of the corolla-tube indicated without by an oblique constriction of the tube, this more pronounced and often slightly saccate on the anterior side.

Lower and upper leaves sessile, the middle on petioles 1-4 mm. long.

6. *S. palustris pilosa*.

Lower leaves petioled, the petioles becoming gradually shorter toward the apex of the stem.

7. *S. stricta*.

Upper lip of corolla 2-2.5 mm. long.

Upper lip of corolla 3-6 mm. long; corolla pale rose and mottled or whitish.

Plants more or less pubescent with straight hairs, rarely tomentose in the inflorescence in

S. rigida.

Leaves oval or ovate, rounded or subcordate at base.

Flower-verticils forming an interrupted spike; corolla pale rose-purple.

8. *S. rigida*.

Flower-verticils crowded, forming a rather short densely flowered spike; flowers whitish; herbage glandular-villous and strong-scented.

9. *S. pycnantha*.

Leaves oblong, narrowed at base, silky canescent with straight more or less appressed hairs.

10. *S. ajugoides*.

Plants more or less densely arachnoid-pubescent with whitish cobwebby hairs.

11. *S. albens*.

1. *Stachys arvensis* L. Field Woundwort. Fig. 4389.

Stachys arvensis L. Sp. Pl. ed. 2. 814. 1763.

Annual, hirsute; stems slender, diffusely branched, ascending or decumbent, 1-6 dm. long. Leaves ovate to oblong-ovate, obtuse at apex, cordate or rounded at base, 1.5-2.5 cm. long, crenate; lower petioles about as long as the blades; flowers in the upper axils and in short terminal bracted spikes; calyx 5-6 mm. long, the teeth narrowly lanceolate, acuminate, about as long as the tube; corolla purplish, 6-10 mm. long.

Sparingly naturalized in Marin and Humboldt Counties, California. Native of Europe. March-April.

2. *Stachys bullata* Benth. California Hedge Nettle. Fig. 4390.

Stachys bullata Benth. Lab. Gen. & Sp. 547. 1834.

Stachys californica Benth. in A. DC. Prod. 12: 469. 1848.

Stachys acuminata Greene, Bull. Calif. Acad. II. 7: 410. 1887.

Perennial, the stems rather slender, simple from the base or branched, 4-8 dm. high, sparsely retrorsely hispid on the angles, the sides sparsely pubescent or hirsute and more or less glandular with sessile glands. Leaves ovate to ovate-oblong, subcordate at base, crenate-serrate, 3-15 cm. long, the lowest with petioles 5-7 cm. long, more or less villous-hirsute or the veins villous-hispid; whorls 6-flowered, rather distinct; calyx villous-pubescent, campanulate-turbinate, 6-7 mm. long, the teeth triangular, cuspidate, spreading in age; corolla purple, tube 8-10 mm. long, upper lip 3-5 mm., the lower 6-10 mm. long, with a horizontal ring of hairs at the base within; filaments villous below.

Shaded slopes and canyons, Transition and Upper Sonoran Zones; Coast Ranges from San Francisco County to Orange County, also on Santa Cruz and Santa Rosa Islands, California. Type locality: probably in the vicinity of Monterey. Collected by Douglas. March-Sept.

3. *Stachys Chamissonis* Benth. Coast Hedge Nettle. Fig. 4391.

Stachys Chamissonis Benth. Linnaea 6: 80. 1831.

Stachys flaccida Eastw. Bull. Torrey Club 29: 80. 1902.

Perennial, the stem stout, simple or branched, 6-10 dm. high, retrorsely hispid with pustulate bristles on the angles, more or less retrorsely pubescent or glabrate on the sides. Leaves ovate to ovate-lanceolate, 6-15 cm. long, cordate at base, acutish to sharply acute at apex, rather coarsely crenate-serrate, densely to thinly appressed-pubescent on both surfaces; petioles 2-6 cm. long, retrorsely villous; spikes 10-50 cm. long, flowers mostly 2-5 in a whorl with all but the lowest pair of subtending leaves reduced to bracts; calyx 11-15 mm. long, densely villous-pubes-

cent and glandular, the teeth triangular to narrowly lanceolate, mucronate; corolla rose-purple, 15–25 mm. long; upper lip 6–9 mm. long, lower 10–13, filaments of stamens hirsute.

Often in partial shade, near the coast, Humid Transition and Upper Sonoran Zones; Humboldt County to San Mateo County, also in San Luis Obispo County, California. Type locality: probably in the vicinity of San Francisco. Collected by Chamisso. June–Oct.

4. *Stachys ciliata* Dougl. Great Hedge Nettle. Fig. 4392

Stachys ciliata Dougl. ex. Benth. Lab. Gen. & Sp. 539. 1834.

Stachys Cooleyae Heller, Bull. Torrey Club 26: 590. 1899.

Stachys caurina Piper, Proc. Biol. Soc. Wash. 32: 42. 1919.

Stachys confertiflora Piper, loc. cit.

Perennial, the stems stout, simple or few-branched, 6–10 dm. high, glabrate or rather sparingly retrorsely hispidulous on the angles, the hairs pustulate at base, puberulent on the sides, and glandular. Leaves narrowly ovate, 7–12 cm. long, cordate at base, acute or short-acuminate at apex, crenate-serrate, more or less appressed-pubescent above, short-villous, or pubescent beneath, petioles villous-pubescent and more or less glandular to nearly glabrate, 2–5 cm. long; verticils 4–6-flowered, in interrupted spikes 8–30 cm. long, the subtending leaves reduced to bracts; calyx 8–12 mm. long, glandular-pilose, the teeth lanceolate to narrowly deltoid, short-spinose; corolla reddish purple, the tube 15–20 mm. long, the ring of hairs within basal and horizontal; upper lip 6–8 mm. long, the lower 10–15 mm.; stamen-filaments pubescent.

Usually moist rich soils, Transition Zones; Vancouver Island to Spokane County, Washington, south to Jackson and Klamath Counties, Oregon. Type locality: on the Columbia River, probably in the vicinity of Fort Vancouver, Washington. June–Aug.

5. *Stachys Emersonii* Piper. Emerson's Hedge Nettle. Fig. 4393.

Stachys ciliata var. *pubens* A. Gray, Syn. Fl. N. Amer. 2: 388. 1878.

Stachys Emersonii Piper, Erythraea 6: 31. 1898.

Stachys pubens Heller, Bull. Torrey Club 25: 581. 1898.

Perennial, hirsute throughout and more or less densely so in the inflorescence, the hairs on the angles of the stems pustulate at base; stems simple or commonly branched, strict, 4–7 dm. high. Leaves with slender petioles 2–4 cm. long, the blades mostly ovate-lanceolate, 5–10 cm. long, cordate or subcordate at base, acute at apex, rather thin, not rugose, coarsely crenate-serrate; flowers in interrupted spikes in the axils of the reduced upper leaves, short-pedicelled; calyx 5–7 mm. long, the lobes lanceolate-subulate, usually spreading; corolla reddish purple, 10–15 mm. long, the tube rather broad, with a horizontal annular band of hairs well above the base within; lower lip 6–8 mm. long, spotted with white.

Moist ground, Humid Transition Zone; British Columbia south through western Washington and Oregon to Mendocino County, California. Type locality: Hoquiam, Chehalis County, Washington. June–Aug.

6. *Stachys palustris* subsp. *pilosa* (Nutt.) Epling. Swamp Hedge Nettle. Fig. 4394.

Stachys pilosa Nutt. Journ. Acad. Phila. 7: 48. 1834.

Stachys scopulorum Greene, Pittonia 3: 342. 1898.

Stachys Leibergii Rydb. Bull. Torrey Club 36: 682. 1908.

Stachys palustris subsp. *pilosa* Epling, Rep. Spec. Nov. Beihefte 80: 63. 1934.

Perennial, the stems rather slender, simple or with a few branches, 3–6 dm. high, more or less villous-pubescent, with interspersed stalked glands. Leaves all sessile or subsessile, linear-lanceolate to broadly lanceolate, 4–8 cm. long, subcordate to rounded at base, acutish or more commonly attenuate at apex, serrate, soft pubescent on both surfaces; spikes becoming interrupted except at apex, 5–15 cm. long; calyx villous, 6–7 mm. long, the teeth lanceolate, cuspidate, as long as the tube; corolla pale rose veined with deeper rose, the tube little longer than calyx; upper lip 3–4 mm. long, the lower 8 mm. long, both villous on the back; filaments glabrous.

Meadows and stream banks, Canadian and Transition Zones; Yukon, Alaska, southeast of the Cascades to Washington, Oregon and northeastern California, east to the Great Lakes. Type locality: "In the valleys of the Rocky Mountains." Collected by Wyeth "on the returning route of Mr. W. from the Falls of the Columbia to the first navigable waters of the Missouri." June–Aug.

7. *Stachys stricta* Greene. Sonoma Hedge Nettle. Fig. 4395.

Stachys stricta Greene, Erythraea 2: 122. 1894.

Stachys ajugoides var. *stricta* Jepson, Fl. W. Mid. Calif. 457. 1901.

Perennial, villous-hirsute throughout with abundant resinous glands beneath the pubescence, the stems erect or decumbent, 6–12 dm. high. Leaves ascending or suberect, the middle and upper short-petioled or subsessile, deltoid-lanceolate, 5–15 cm. long, acute or rounded at apex, subcordate at base, crenate-serrate; spikes becoming interrupted; verticils globose, 8–12-flowered; calyx 5–6 mm. long, the teeth deltoid, remaining erect in age, about equaling the tube; corolla white, tube about 6 mm. long, barely exerted, inner hairy ring only slightly oblique, well below the middle, exteriorly indicated by a faint suggestion of a spur on the lower side; upper lip less than 2 mm. long, not hooded, lower lip 4 mm. long, its lateral lobes reduced to minute recurved teeth; filaments short, not exerted beyond tube, pubescent below.

Wet meadows, bogs, Upper Sonoran Zone; North Coast Ranges, Mendocino, Sonoma, Lake, and Glenn Counties, and the foothills of the Sierra Nevada from Butte County to Merced County, California. Type locality: Knights Valley, Sonoma County. June–Sept.

8. *Stachys rigida* Nutt. Rigid Hedge Nettle. Fig. 4396.

Stachys rigida Nutt. ex Benth. in A. DC. Prod. 12: 472. 1848. *S. bullata* of authors, not Benth.

Stachys bracteata Greene, Pittonia 3: 342. 1898.

Stachys vestita Howell, Fl. N.W. Amer. 558. 1901.

Stachys ajugoides var. *rigida* Jepson & Hoover, in Jepson, Fl. Calif. 3: 426. 1943.

Perennial with creeping rootstocks, the stems erect or somewhat decumbent, simple or branched above, 3-12 dm. high, more or less densely villous-hirsute with spreading or slightly reflexed hairs. Leaves oblong-ovate to oblong-lanceolate, rounded or subcordate at base, acute or acutish at apex, crenate-serrate 2.5-10 cm. long, softly appressed-pubescent on both surfaces; lower petioles mostly 2.5-4 cm. long, gradually shorter above; spikes becoming interrupted in age, often 10-20 cm. long; bracts ovate-lanceolate, usually well-exceeding the calyx, with 1-3 flowers in each axil; calyx campanulate, the teeth narrowly deltoid, about equaling the tube, mucronulate, densely villous-hirsute; corolla 12-16 mm. long, rose-purple or veined with purple, longer than the calyx; upper lip 3-4 mm., the lower 5-6 mm. long; tube usually exceeding the calyx by 2-3 mm.; stamens a little shorter than the upper lip and included; filaments densely hairy at the middle.

Mostly in low ground, either in the open or in the shade; mainly Transition Zones; Columbia River southward on both sides of the Cascades and the Willamette Valley, Oregon, to Lassen and Butte Counties in the Sierra Nevada, and Lake County in the Coast Ranges, California. Type locality: on the Columbia River. Collected by Nuttall. July-Aug.

Stachys rigida subsp. *quercetorum* (Heller) Epling, Rep. Spec. Nov. Beihefte 80: 59. 1934. (*Stachys*



4390. *Stachys bullata*

4391. *Stachys Chamissonis*

4392. *Stachys ciliata*

4393. *Stachys Emersonii*

4394. *Stachys palustris*

4395. *Stachys stricta*

Nuttallii var. *leptostachya* Benth. Pl. Hartw. 331. 1849; *S. viarum* Heller, Muhlenbergia 2: 316. 1907; *S. gracilenta* Heller, op. cit. 319; *S. quercetorum* Heller, op. cit. 318.) Stems more or less decumbent, rarely erect, 4–6 dm. high, more or less hirsute, simple or usually branched. Leaves ovate or somewhat deltoid, 3–7 cm. long or rarely longer, cordate at base, obtusish to rounded at apex, prominently crenate or crenate-dentate, thinly pubescent above with upwardly appressed hairs, densely so below with hairs appressed in all directions; lower petioles 2.5–4 cm. long; bracts ovate, rounded at apex; calyx campanulate, densely pubescent, the teeth spreading at apex, triangular-lanceolate, prominently mucronate; corolla pinkish or white, mottled with rose-purple, the tube usually exerted 3–4 mm.; upper lip 3–4 mm. long; stamens included in the upper lip, their filaments densely woolly on the lower half; hairy ring within very oblique, its lower extremity marked without by a short saccate spur. Open roads and banks, mainly Upper Sonoran Zone; scatteringly distributed as far north as Douglas County, Oregon, but main distribution is from Mendocino, Sonoma and Butte Counties, California, to northern Lower California. In the Coast Ranges of northern California are forms intermediate between this and the typical species, and these intermediate forms are also found in the San Bernardino and Cuyamaca Mountains, southern California. Type locality: above Crystal Springs, on the Half Moon Bay road, San Mateo County, California.

Stachys rigida subsp. *rivularis* (Heller) Epling, Rep. Spec. Nov. Beihefte 80: 60. 1934. (*Stachys Pratensis* Durand, Journ. Acad. Phila. II. 3: 100. 1853; *S. littoralis* Greene, Pittonia 3: 341. 1898; *S. striata* Greene, loc. cit.; *S. ingrata* Greene, loc. cit.; *S. rivularis* Heller, Muhlenbergia 1: 33. 1904; *S. veronicaefolia* Davy ex Jepson, Man. Fl. Pl. Calif. 878. 1925.) Stems mostly slender, strictly erect, simple or with a few erect or ascending branches, villous-hirsute and somewhat glandular. Leaves narrowly oblong to broadly oblong or rarely oblong-oval, 2.5–5 cm. long, rounded to subcordate at base, obtuse or more commonly rounded at apex, crenate-serrate, about evenly and rather thinly villous-hirsute, lower petioles mostly less than 2.5 cm. long; calyx-teeth about half the length of the tube, rarely if ever recurved. Moist places, along mountain streams and in swamps, Transition and Canadian Zones; Jackson and Klamath Counties, Oregon, south in the Sierra Nevada to Tuolumne County, California, and Washoe County, Nevada. Type locality: "Truckee river, one mile above Truckee," California. July–Sept.

Stachys rigida subsp. *lanata* Epling, Madroño 4: 270. 1938. Stems rather strict, mostly simple or few-branched above, 25–30 cm. high, densely and somewhat retrorsely hirsutulous. Leaves oblong to lanceolate, subcordate at base, 3.5–7 cm. long, silvery with a dense appressed silky pubescence; lower petioles 3–10 mm. long; spikes rather congested; calyx-lobes little or not at all recurved. Siskiyou Mountains, Del Norte County, California. Type locality: "Bear Basin near Gasquet," California.

9. *Stachys pycnantha* Benth. Short-spiked Hedge Nettle. Fig. 4397.

Stachys pycnantha Benth. Pl. Hartw. 331. 1849.

Perennial, simple or often branched at base and above, strongly scented, stems erect, 3–10 dm. high, soft-villous, with spreading hairs and glandular-puberulent. Leaves ovate to oblong-lanceolate, 5–13 cm. long, crenate-serrate, subcordate to rounded at base, obtusish or rounded at apex, soft-villous on both surfaces with intermixed sessile glands, the lower long-petioled, the uppermost short-petioled or subsessile; spikes densely flowered, subcapitate, 4–5 cm. long, rarely slightly interrupted below; calyx densely villous, campanulate, 6–7 mm. long, the teeth narrowly deltoid, a little shorter than the tube, cuspidate; corolla white with purple veins, upper lip 4 mm., the lower 6 mm. long, tube barely equaling the calyx, the ring of hairs within just below the center very oblique and marked by distinct spur; filaments purple, glabrous.

Wet places, Upper Sonoran Zone; Marin and Contra Costa Counties, south to San Benito and San Luis Obispo Counties, California. Type locality: "In umbrosis montium Carmel," California. June–Oct.

10. *Stachys ajugoides* Benth. Bugle Hedge Nettle. Fig. 4398.

Stachys ajugoides Benth. Linnaea 6: 80. 1831.

Perennial, stem simple and erect, or more or less branched at base and decumbent, 10–60 cm. long, densely to thinly villous, and more or less glandular. Leaves mostly oblong, rounded at apex and narrowed at base, or the upper rarely acutish at apex, densely villous-hirsute more or less on both surfaces, crenate to crenate-serrate, the lower with petioles often as long as the blades, the upper subsessile; spikes distinctly bracted, approximate or becoming interrupted and 8–20 cm. long; verticils 6-flowered; calyx 6–8 mm. long, densely villous, the teeth lanceolate or ovate-deltoid, cuspidate; corolla white, pale rose or white with purple veins, 10–15 mm. long; tube 7–9 mm. long, with hairy ring just below the middle of the tube marked externally by a small sac at base; upper lip 4–6 mm., lower 5–7 mm. long; filaments pubescent toward the base.

Low, moist ground, Upper Sonoran and Transition Zones; California Coast Ranges from Sonoma and Glenn Counties to Los Angeles County, California. Type locality: probably near San Francisco, California. Collected by Chamisso. May–Oct.

11. *Stachys álbens* A. Gray. White Hedge Nettle. Fig. 4399.

Stachys álbens A. Gray, Proc. Amer. Acad. 7: 387. 1868.

Stachys velutina Greene, Erythraea 2: 121. 1894.

Stachys lanuginosa Greene, Pittonia 3: 342. 1898.

Stachys malacophylla Greene, op. cit. 343.

Stachys ajugoides var. *velutina* Jepson, Fl. W. Mid. Calif. 457. 1901.

Stachys álbens var. *juliensis* Jepson, Man. Fl. Pl. Calif. 877. 1925.

Perennial with stout erect stems, 3 dm.–2 m. high, usually branched, more or less densely white-woolly. Leaves 3–12 cm. long, narrowly to broadly ovate or rarely lanceolate-ovate, acute or obtusish at apex and usually cordate or subcordate at base, rarely oblong or oblong-ovate and obtuse at base, silky-villous above, villous-tomentose beneath, crenate-serrate; spikes becoming interrupted in age, 8–20 cm. long, densely villous-tomentose; bracts often longer than the calyx, spreading; calyx 7 mm. long, slightly bilabiate, densely villous-tomentose, teeth triangular to lanceolate, about 3 mm. long, cuspidate; corolla white or pale rose with purple veins, upper lip 6 mm. long, the lower 6–8 mm. long, tube barely equaling the calyx, about 6 mm. long with a small sac below the middle at the lower edge of the very oblique hairy ring; filaments tomentose.

Moist stream banks or swamps, Upper Sonoran and Transition Zones; mostly in the interior foothills, Lake and Tuolumne Counties to Los Angeles and San Bernardino Counties, also White Mountains, Inyo County, California. Type locality: near Fort Tejon, Tehachapi Mountains. May–Oct.

14. **ACANTHOMINTHA** A. Gray, ex Benth. & Hook. Gen. Pl. 2:1192. 1876.

Annual, glabrous or pubescent, aromatic herbs, with denticulate, serrulate or entire leaves. Flowers verticillate in the axils of the upper leaves, each whorl subtended by a pair of leaves and several conspicuous membranous bracts with callous margins armed with several slender divergent spines. Calyx 2-lipped; upper lip with 3 aristate teeth, the lower with 2 oblong acute or spine-tipped lobes. Corolla 2-lipped, white or tinged with rose, and the palate cream-yellow; upper lip entire or erect or 2-lobed at apex and falcate; lower lip reflexed, broadly 3-lobed; tube well-exserted, with a funnelliform throat. Stamens inserted high on the throat, the lower pair antheriferous, the upper pair shorter and their anthers slightly smaller, or in one species obsolete or rudimentary. Style slender, 2-lobed, the lower lobe longer. Nutlets ovoid, smooth. [Name Greek, meaning thorn and mint.]

A unique Californian genus of 3 species. Type species, *Acanthomintha ilicifolia* A. Gray.

Upper lip of corolla more or less arcuate-falcate, 2-lobed at apex; style pubescent; anthers glabrous.

Upper lip erect, 3–4 mm. long, galeate; style glabrous.

Anthers villous or pubescent, all 4 developed.

Anthers often minutely papillate, otherwise glabrous, only 2 developed, those on the shorter upper filaments obsolete or rudimentary.

1. *A. lanceolata*.

2. *A. obovata*.

3. *A. ilicifolia*.

1. **Acanthomintha lanceolata** Curran. Santa Clara Thornmint. Fig. 4400.

Acanthomintha lanceolata Curran, Bull. Calif. Acad. 1: 13. 1884.

Annual, the stems branching or sometimes simple, 10–25 cm. high, retrorsely puberulent and more or less glandular-pubescent or -villous, especially above with spreading hairs. Leaves broadly ovate to oblong-lanceolate, 1–2 cm. long, entire or minutely denticulate, the uppermost usually prominently spine-tipped, narrowed at base to a petiole about equaling the blade; bracts oval to oblong-ovate, 8–12 mm. long, glandular-pubescent, membranous with thick callous margins, armed with 7–9 long divergent spines; calyx, including the spinescent teeth, 12 mm. long, villous-pubescent; corolla white or the tips tinged with pale rose, 20–25 mm. long, glandular-pubescent externally; upper lip 8–10 mm. long, more or less arcuate-falcate, 2-lobed at apex, lower lip spreading, 3-lobed, about as long as the upper or somewhat shorter; all 4 stamens antheriferous; anthers glabrous; styles pubescent.

Dry open slopes, Upper Sonoran Zone; Inner Coast Ranges of California from Calaveras Valley, Mount Hamilton Range, to Priest Valley, Monterey County. Type locality: Calaveras Valley near the boundary of Alameda and Santa Clara Counties. April–June.

2. **Acanthomintha obovata** Jepson. San Benito Thornmint. Fig. 4401.

Acanthomintha obovata Jepson, Man. Fl. Pl. Calif. 873. 1925.

Low annual, stems branching from near the base, 1–2 dm. high, puberulent. Leaves oblong-lanceolate to ovate or obovate, cuneately narrowed below from near the middle, acute or obtusish at apex, 8–12 mm. long, sparsely serrulate or the uppermost often acicular-toothed, densely strigose above, short-pubescent beneath; petiole often longer than the blades; bracts broadly ovate to suborbicular, rounded or commonly subcordate at base, glabrate or sparingly puberulent, shining, armed with 7–9 prominent spines; calyx puberulent, or sometimes also sparingly pubescent; corolla white, or the lips tinged with purple, 15 mm. long; upper lip entire, 4 mm. long, somewhat galeate; anthers conspicuously woolly-pubescent, those of the upper pair of stamens smaller; style glabrous.

Dry soils on open slopes, Upper Sonoran Zone; Inner Coast Ranges of California, from San Benito County to northern Ventura County. Type locality: Lorenzo Creek, southern San Benito County, California. April–June.

Acanthomintha obovata subsp. *Duttonii* Abrams. Calyx and branches of the inflorescence glabrate or microscopically puberulent; anthers short-pubescent, rather than woolly-villous.

Calycis puberulentis vel glabriusculis, antheris brevi-pubescentibus.

Grassy hills, especially on serpentine outcrops, in southern San Mateo County between Redwood City and Woodside, California. Named in honor of Mr. H. A. Dutton, who first discovered the plant in April, 1900. Type, Woodside serpentine. *H. A. Dutton* (no. 63392 Dudley Herbarium).

3. **Acanthomintha ilicifolia** A. Gray. San Diego Thornmint. Fig. 4402.

Calamintha ilicifolia A. Gray, Proc. Amer. Acad. 8: 368. 1872.

Acanthomintha ilicifolia A. Gray, Syn. Fl. N. Amer. 2: 365. 1878.

Low annual, stems branching from the base or sometimes simple, 5–15 cm. high, glabrous or sparingly and minutely puberulent. Leaves 5–15 mm. long, cuneately narrowed from about the middle to a petiole of about an equal length, prominently serrate-denticulate above the middle, or those at the apex of the stem with the teeth bristle-tipped, glabrous or sparingly puberulent; bracts orbicular or broadly cordate, the callous margins armed with 7–9 long slender widely spreading spines, glabrous and shining or microscopically glandular-puberulent; calyx 5 mm. long, including the acicular teeth, these villous-ciliate on the margins; corolla 12 mm. long, white except the lobes of the lower lip rose and the palate cream color; upper lip erect, 3–4 mm. long, entire, strongly concave and somewhat galeate; lower lip spreading, 5–6 mm. long, 3-lobed, bearing a tuft of prominent hairs toward the base within; anther-bearing stamens 2, the upper pair abortive; anthers minutely papillate, otherwise glabrous; styles glabrous.

Dry mesas or hills, usually in gravelly soils, Lower Sonoran Zone; western San Diego County, California, and adjacent Lower California. Type locality: San Diego. April–June.

15. *SÁLVIA* [Tourn.] L. Sp. Pl. 23. 1753.

Aromatic herbs or shrubs, with clustered often showy flowers arranged in more or less interrupted spikes or less commonly in racemes or panicles. Calyx ovoid, tubular or campanulate, 2-lipped; upper lip entire or 3-toothed; lower lip 2-cleft or 2-toothed; or the lips and teeth entirely suppressed and the orifice very oblique and entire. Corolla strongly 2-lipped; upper lip usually concave or arched, entire, emarginate or 2-lobed; lower lip spreading or drooping, 3-lobed. Stamens 2, the posterior pair wanting or rudimentary, inserted on the throat of the corolla; anther-connective elongate, articulate with the filament and often equaling or exceeding it in length, both ends of the connective prolonged and bearing a fertile pollen cell at each end, or the lower arm completely suppressed or rudimentary and sterile. Style 2-cleft at the summit; ovary deeply 4-parted. Nutlets smooth, in some species developing mucilage and spiral tube when wetted. [The ancient Latin name for sage.]

A large genus of over 500 species, widely distributed in temperate and tropical regions but especially highly developed in South America. Type species, *Salvia officinalis* L.

Lower end of the anther-connective prolonged beyond the articulation with the filament and bearing an anther-cell at the tip.

Annual herbs.

Flowers yellow, scattered in ample panicles; leaves scattered, irregularly lobed and toothed; herbage densely arachnoid. 1. *S. Aethiopsis*

Flowers lavender or blue, in large capitate verticils, these solitary or forming an interrupted spike; leaves basal. 2. *S. carduacea*.

Plants white-woolly, thistle-like; leaves sinuate-lobed and spinulose-toothed; corolla lavender, 25–35 mm. long, its lower lip fimbriate. 3. *S. Columbariae*.

Plants pubescent; leaves pinnatifid or bipinnatifid, the divisions crenate; corolla blue, 12–15 mm. long, its lower lip not fimbriate. 4. *S. funerea*.

Desert shrubs; leaves simple, spiny-toothed or entire and tipped with a spine.

Calyx densely white-woolly, its teeth deltoid.

5. *S. Greatai*.

Calyx tomentose with short branched hairs like those of the leaves, its teeth lanceolate-spinose.

Lower end of the anther-connective not prolonged below the articulation with the filament, if so, short and without anther-cell; leaves simple, entire or crenate, never spinose.

Perennial herbs; corolla purplish red, about 3 cm. long; anther-connective prolonged below the articulation.

6. *S. spathacea*.

Shrubby or one species mat-like with creeping woody stems; anther-connective not prolonged below the articulation.

Mat-like plants with creeping woody stems and short erect scape-like herbaceous flowering stems; leaves oblanceolate, crenate. 7. *S. sonomensis*.

Shrubs, some species low but never creeping and mat-like.

Leaves entire, obovate to spatulate, caescent on both surfaces with minute simple hairs; bracts usually colored.

Corolla about 15 mm. long or less, its tube pubescent within, but without a definite band of hairs. 8. *S. Dorrii*.

Corolla about 20 mm. long, its tube with a definite band of hairs forming a transverse ring on the inner surface below the middle. 9. *S. pachyphylla*.

Leaves crenate or crenulate.

Stamens lying close under the upper lip of the corolla and little or not at all exceeding it, or wholly included within the corolla-tube. 10. *S. melifera*.

Stamens not lying close under the upper lip, and much exceeding it, often divaricate or declinate.

Pubescence of simple hairs; calyx-teeth of the lower lip evident.

Leaves bullate-rugose and green on the upper surface.

Bracts pale green or whitish, membranous; lower lip of corolla longer than the upper; leaves strongly reticulate and bispidulous beneath.

Middle lobe of the lower lip of corolla erose.

11. *S. eremostachya*.

Middle lobe of the lower lip of corolla not erose.

12. *S. mohavensis*.

Bracts green, tinged with purple; lower lip of corolla shorter than the upper; leaves densely tomentose beneath.

13. *S. Clevelandii*.

Leaves similarly whitish-caescent on both surfaces with minute appressed hairs.

Flowers in capitate verticils forming a simple interrupted spike; bracts and calyx-teeth prominently bristle-tipped.

14. *S. Vaseyi*.

Flowers in small branching clusters forming thyrsoid panicle; bracts and calyx not bristle-tipped.

15. *S. apiana*.

Pubescence densely caescent, composed of short much-branched hairs; calyx-teeth and -lips completely united, the orifice therefore entire and very oblique.

16. *S. leucophylla*.

1. *Salvia Aethiopsis* L. African Sage. Fig. 4403.

Salvia Aethiopsis L. Sp. Pl. 27. 1753.

Annual with stout branched stems, 5–10 dm. high, herbage floccose-tomentose. Lower leaves ample, 1–3 dm. long, short-petioled, ovate, incised and dentate, the upper leaves greatly reduced; inflorescence ample, much-branched; bracts orbicular, clasping, pungently tipped at apex, dotted with yellow glands; flowers 1–3 in the axils of each bract, short-pedicelled; calyx densely woolly-tomentose; corolla pale yellow, 12–18 mm. long; upper lip strongly arched, as long as the tube.

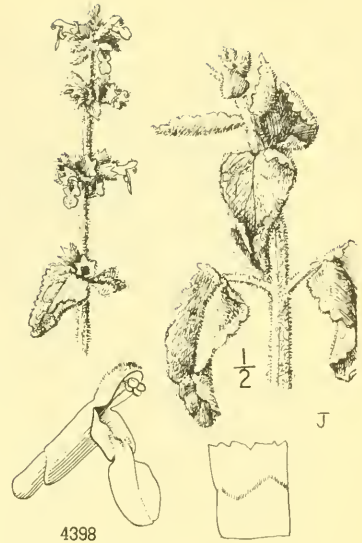
This species, a native of northern Africa, is established in a number of places in Oregon, but most abundantly in southern Lake County, Oregon; also in Lassen and Plumas Counties, California. June–Aug.



4396



4397



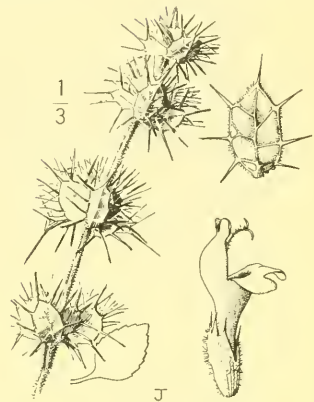
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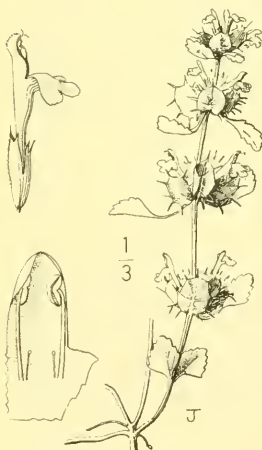
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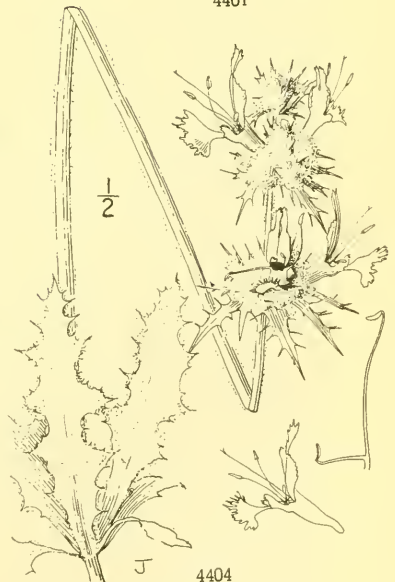
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4404

4396. *Stachys rigida*
 4397. *Stachys pycnantha*
 4398. *Stachys ajugoides*

4399. *Stachys albens*
 4400. *Acanthomintha lanceolata*
 4401. *Acanthomintha obovata*

4402. *Acanthomintha ilicifolia*
 4403. *Salvia Aethiopsis*
 4404. *Salvia carduacea*

2. *Salvia carduacea* Benth. Thistle Sage. Fig. 4404.

Salvia carduacea Benth. Lab. Gen. & Sp. 302. 1833.

Annual, the whole plant white-woolly and thistle-like, the stems 1 to several, stout and scape-like, 2-5 dm. high. Leaves several, basal, sinuate-pinnatifid, and spinulose-toothed, 3-30 cm. long; flowers in 1-4 dense head-like verticillate clusters, these 2-4 cm. broad, equaled or surpassed by the lanceolate pectinate-toothed bracts; calyx densely long-woolly, 10-15 mm. high, the lobes tipped with a long spine; corolla lavender, 20-25 mm. long; upper lip erose-denticulate and cleft; lower lip with a large fan-shaped middle lobe fimbriate on the margin; filaments very short, the lower arm of the long filiform anther-connective bearing a fertile anther-cell.

Sandy and gravelly soils, Upper and Lower Sonoran Zones; Contra Costa County, California, south to northern Lower California and eastward to the western parts of the Mojave and Colorado Deserts. Type locality: "Hab. in California Douglas." In describing this strikingly different *Salvia* Bentham proposed a new section for the genus which he called *Echinosphece*. March-June.

3. *Salvia Columbariae* Benth. Chia. Fig. 4405.

Salvia Columbariae Benth. Lab. Gen. & Sp. 302. 1833.

Pycnosphace Columbariae Rydb. Fl. Rocky Mts. 747, 1066. 1917.

Annual, branching and leafy below, naked and peduncle-like above or with 1-4 leafy-bearing nodes, 2-5 dm. high, more or less cinereous with short recurved hairs. Basal leaves 5-12 cm. long, the petioles about as long as the blades, these 1-2-pinnatifid into toothed or incised irregular divisions, cinereous-tomentose; stem-leaves similar but reduced; flowers in capitate verticils 1-3 cm. in diameter, terminating the stems and branches; bracts suborbicular, awn-tipped, green or often purplish, sparsely ciliate on the margins; calyx about 1 cm. long; upper lip arched, tipped with 2 partly connate short-awned teeth; corolla blue, but little longer than the calyx; upper lip small, emarginate; middle lobe of lower lip transversely oval and 2-lobed, its margin not fimbriate.

Plains and hillsides, usually in gravelly or sandy soils, Upper and Lower Sonoran Zones; North Coast Ranges and Sacramento Valley, California, to central Lower California, southern Nevada, Arizona, and Sonora. Type locality: "Hab. in California Douglas." March-July. Bentham, in his classical work on the mint family, proposed a new section for this new California sage which he called *Pycnosphace*. March-July.

× *Salvia bernardina* Parish ex Greene, Bull. Calif. Acad. 1: 211. 1885. (*Salvia Columbariae* var. *bernardina* Jepson, Man. Fl. Pl. Calif. 869. 1925.) As pointed out by Asa Gray (Syn. Fl. N. Amer. ed. 2. 2: 460. 1886) and Munz (Man. S. Calif. 444. 1935) these plants are probably natural hybrids between *Salvia Columbariae* and *S. mellifera*. They flower as an annual, but some plants persist longer, the stems becoming lignescent; leaves once-pinnatifid; upper lip of calyx with 3 spine-like teeth.

These apparently natural hybrids are found mainly in the San Bernardino Valley, southern California, and occur where the two supposed parents grow together. If future genetic studies bear out the conclusions of field observation, these hybrids offer one of the strongest arguments for uniting Bentham's genus *Audibertia* with the genus *Salvia*.

4. *Salvia funerea* M. E. Jones. Death Valley Sage. Fig. 4406.

Salvia funerea M. E. Jones, Contr. West. Bot. No. 12: 71. 1908.

Salvia funerea var. *forficis* Jepson, Man. Fl. Pl. Calif. 868. 1925.

Low densely branched shrub, 5-8 dm. high, older branches whitish with flaky bark, the young densely white-tomentose with short multibranched hairs. Leaves rather crowded, especially at the base of the branchlets, thick and leathery, lanceolate to ovate, 1.5-2.5 cm. long, acuminate and spine-tipped, entire or with 1-2 pairs of lateral spine-like teeth, narrowed to a short broad petiole, densely white-tomentose; bracts similar to the leaves but broadly ovate and with 2-3 pairs of lateral spine-like teeth, prominently veined and densely white-tomentose on both surfaces; flowers usually 1-2 in each axil, forming interrupted leafy-bracted spikes; calyx densely white-woolly, cylindric, 4-6 mm. long, the teeth short; corolla violet, 12-16 mm. long; middle lobe of the lower lip rounded, about 3 mm. broad, erose, the lateral lobes a little over 1 mm. long; upper lip 2.5 mm. long.

Rocky cliffs, Lower Sonoran Zone; canyons of the Funeral Mountains, Death Valley, Inyo County, California. Type locality: Funeral Mountains, California. March-May.

5. *Salvia Greatai* Brandg. Orocopia Sage. Fig. 4407.

Salvia Greatai Brandg. Zoe 5: 229. 1906.

Low much-branched shrub, 1-1.5 m. high, the bark of older branches light-colored and flaky; young twigs tomentose with branched hairs. Leaves thick and leathery, ovate to ovate-lanceolate, pinnatifid-toothed, with 2-3 pairs of prominent divaricate spine-like teeth, attenuate at apex into a prominent spine, those at the base of the branchlets few, smaller and narrower, light gray-green, prominently veined, rather thinly tomentose with short branched hairs; flower-verticils 6-10-flowered, usually 4-5, about 4 cm. apart forming an interrupted spike, subtended by a pair of foliaceous bracts resembling the leaves and a number of smaller inner ones; calyx tomentose, about 8 mm. long; upper lip tipped with a spine with 2 smaller spines near its base representing lobes, the lower lip parted into 2 linear-lanceolate spinulose-awned lobes; corolla about 15 mm. long, pale lavender, its upper lip 3 mm. long, 2-lobed, the lower lip slightly longer, 3-lobed, its middle lobe irregularly fimbriate; lower arm of the anther-connective half as long as the upper, bearing an anther-cell at its tip.

Desert washes, Lower Sonoran Zone; a very local species known only from the vicinity of Dos Palms, in the Orocopia Mountains, Colorado Desert, Riverside County, California. Type locality: Salt Creek Wash, near Dos Palms, California. April.

6. *Salvia spathacea* Greene. Pitcher Sage. Fig. 4408.

Audibertia grandiflora Benth. Lab. Gen. & Sp. 312. 1833.
Salvia spathacea Greene, Pittonia 2: 236. 1892.
Audibertiella grandiflora Briq. Bull. Herb. Boiss. 2: 73. 1894.
Ramona grandiflora Briq. op. cit. 440.

Perennial herb with usually stout somewhat woody root, producing generally only one stout erect herbaceous stem, 3-7 dm. high, simple or rarely with 2-3 branches above, glandular-villous and viscid. Leaves 7-20 cm. long, commonly numerous at base and scattered along the stem to the inflorescence, broadly to rather narrowly lanceolate or sometimes oblong, the lower hastate and rather long-petioled, the upper subsessile and truncate, irregularly crenate, more or less densely white-villous beneath, thinly villous-pubescent and rugose above; verticils large, usually 3-6, forming an interrupted terminal spike 15-30 cm. long; bracts ovate to ovate-lanceolate, entire, 1.5-4 cm. long, often tinged with reddish purple; calyx 1.5-2 cm. long, its upper lip concave and spathe-like; corolla about 3 cm. long, purplish red; upper lip 4-5 mm. long; lower lip reflexed, its middle lobe broadly obcordate; stamens well-exserted; lower arm of the anther-connective prolonged below the articulations, about half the length of the upper arm, sometimes bearing a rudimentary but sterile anther-cell at the apex.

Usually in rich soils on grassy or shaded slopes, Upper Sonoran Zone; California Coast Ranges from the Vaca Mountains and Mount Diablo, central California, south especially near the coast to Orange County. Type locality: California. Collected by Douglas. Crimson Sage. March-May.

7. *Salvia sonomensis* Greene. Creeping Sage. Fig. 4409.

Audibertia humilis Benth. Lab. Gen. & Sp. 313. 1833. Not *Salvia humilis* Benth.
Salvia sonomensis Greene, Pittonia 2: 236. 1892.
Ramona humilis Greene, Erythea 1: 144. 1893.
Audibertiella humilis Briq. Bull. Herb. Boiss. 2: 73. 1894.

Mat-like plants with creeping woody stems, the seasonal flowering stems scape-like, 1-3 dm. high, with 1 or 2 remote pairs of reduced leaves, pubescent with short recurved hairs. Basal leaves numerous, more or less densely cinereous-puberulent on both surfaces and finely rugose, oblong to oblanceolate, crenulate, the blades 3-5 cm. long, rounded at apex, narrowed below to an elongated petiole often equaling or exceeding the blade; verticils densely flowered, mostly 5-8, becoming remote in age; bracts ovate-lanceolate, 10-15 mm. long; calyx about 8 mm. long, the teeth of the upper lip barely over 1 mm. long; corolla bluish violet, about 15 mm. long; upper lip short; middle lobe of lower lip orbicular, reflexed, 7-8 mm. long, denticulate, the lateral lobes minute or obsolete.

Dry rocky ridges or slopes, Upper Sonoran and Transition Zones; Siskiyou County south to Mariposa and Monterey Counties, and reappearing in the Cuyamaca Mountains, San Diego County, California. Type locality: "Hab. in California septentrionale Douglas." April-June.

8. *Salvia Dorrrii* (Kell.) Abrams. Gray Ball Sage. Fig. 4410.

Audibertia Dorrrii Kell. Proc. Calif. Acad. 2: 190. fig. 57. 1863.
Audibertia incana var. *pilosa* A. Gray, Syn. Fl. N. Amer. ed. 2: 461. 1886.
Salvia pilosa Merriam, N. Amer. Fauna 72: 322. 1893.
Audibertiella Dorrrii Briq. Bull. Herb. Boiss. 2: 73. 1894.
Ramona Dorrrii Briq. in Engler & Prantl, Nat. Pflanzenf. 43a: 287. 1897.
Ramona pilosa Abrams, Bull. N.Y. Bot. Gard. 6: 443. 1910.
Salvia carnosa var. *pilosa* Jepson, Man. Fl. Pl. Calif. 870. 1925.

Low much-branched shrub 3-8 dm. high and often as broad, the leaf-bearing branches erect, densely scurfy-canescens and punctate-glandular. Leaves obovate or spatulate, rounded at apex, more or less abruptly narrowed at base, 1.5-2.5 cm. long, scurfy-canescens and glandular-punctate; flower-verticils mostly 3-4, 1-2 cm. distant but in age often appearing contiguous; bracts oblong-elliptic to suborbicular, 7-10 mm. long, green or commonly tinged with rose-purple, thinly strigose with upwardly appressed sharp-pointed hairs or often pilose with spreading and more or less wavy hairs, conspicuously ciliate on the margins, the cilia longer in the forms with pilose pubescence; calyx about 5 mm. long, lower lip deeply divided into 2 ovate teeth, upper lip entire, nearly truncate to rounded at apex; corolla blue, about 10 mm. long, upper lip erect, 2-cleft, lower lip 3-lobed with the middle lobe erose and longer than the lateral; stamens long-exserted, the upper pair short and sterile.

Dry ridges, mainly Upper Sonoran Zone; on the inland and desert slopes of the mountains, southeastern Oregon and northeastern California to Riverside County, California, and western Nevada. Type locality: western Nevada, probably in the vicinity of Virginia City. May-July.

Salvia Dorrrii subsp. *carnosa* (Dougl.) Abrams. (*Salvia carnosa* Benth. Bot. Reg. 17: under *pl.* 1469, as a synonym. 1832; *Audibertia incana* Benth. loc. cit. Not *Salvia incana* Mart. & Gal. 1844.) Leaves oval to oblong, tapering to and longer than the petioles, scurfy-canescens; bracts glabrate or minutely puberulent. Mostly rocky or gravelly soil, Upper Sonoran Zone; eastern Washington and eastern Oregon to Idaho. Type locality: "Mr. Douglas found it on the plains of the Colombia, near the Priest's Rapid, and on clayey hills near the Big Birch, in 1826."

Salvia Dorrrii subsp. *Gilmánii* (Epling) Abrams. (*Salvia carnosa* subsp. *Gilmánii* Epling, Ann. Mo. Bot. Gard. 25: 132. 1938.) Leaves very scurfy-hoary, including the petioles 10-15 mm. long, the blades rounded or broadly spatulate, abruptly narrowed to the petiole; verticils seldom over 15 mm. in diameter; bracts short-ciliate on the margins and thinly strigose on the back; corolla-tube little-exserted beyond the bracts. Desert mountain slopes and benches, mainly Upper Sonoran Zone; eastern Mojave Desert, especially in the Death Valley region, California. Type locality: Piñon Mesa, Wild Rose Canyon, Panamint Mountains.



4405



4406



4407



4408



4409



4410



4411



4412



4413

4405. *Salvia Columbariae*
 4406. *Salvia funerea*
 4407. *Salvia Gretaia*

4408. *Salvia spathacea*
 4409. *Salvia sonomensis*
 4410. *Salvia Dorrii*

4411. *Salvia pachyphylla*
 4412. *Salvia mellifera*
 4413. *Salvia eremostachya*

9. *Salvia pachyphylla* Epling. Thick-leaved or Rose Sage. Fig. 4411.

Audibertia incana var. *pachystachya* A. Gray, Syn. Fl. N. Amer. ed. 2. 2^a: 461. 1886.

Audibertia pachystachya Parish, Erythea 6: 91. 1898. Not *Salvia pachystachya* Trautv.

Ramona pachystachya Heller, Muhlenbergia 1: 4. 1900.

Salvia carnososa var. *compacta* Hall, Univ. Calif. Pub. Bot. 1: 111. 1902.

Salvia compacta Munz, Bull. S. Calif. Acad. 26: 22. 1927. Not *Salvia compacta* Kuntze.

Salvia pachyphylla Epling ex Munz, Man. S. Calif. 445, 600. 1935.

Low compact shrub, woody at base, 3–5 dm. high, the branches ascending or spreading, decumbent, minutely scurfy-canescens. Leaves mostly 2–3 cm. long, obovate to oblanceolate, rounded at apex, narrowed below to a short (5–15 mm.) petiole, entire, scurfy-puberulent and hoary on both surfaces, glandular-dotted; whorls of the inflorescence approximate, forming a continuous or slightly interrupted spike 4–10 cm. long, and 3–4 cm. broad, bracts showy, purple, oblong to obovate, 15–25 mm. long, usually rounded at apex, ciliate on the margins, otherwise glabrous or minutely puberulent; calyx about 12 mm. long; upper lip entire, truncate, the lower of 2 acute, deltoid teeth; corolla violet-blue, the tube 15–20 mm. long; lobes of the upper lip 4–6 mm. long, united to the middle; lower lip 6–8 mm. long, the middle lobe emarginate and erose; stamens well-exserted, the connective as long as the filament, its lower end completely suppressed below the articulation.

Rocky or gravelly slopes, Arid Transition Zone; San Bernardino Mountains, southern California, to San Pedro Martir Mountains, Lower California, and in the following desert ranges of southern California: Panamint, Santa Rosa, Clark, and New York. Type locality; Bear Valley, San Bernardino Mountains, California. July–Sept.

10. *Salvia mellifera* Greene. Black Sage. Fig. 4412.

Audibertia stachyoides Benth. Lab. Gen. & Sp. 313. 1833. Not *Salvia stachyoides* Kunth.

Salvia mellifera Greene, Pittonia 2: 236. 1892.

Audibertiella stachyoides Briq. Bull. Herb. Boiss. 2: 73. 1894.

Ramona stachyoides Briq. op. cit. 440.

Shrub, branching and leafy, 1–2.5 m. high, cinereous-tomentose or glabrate, and somewhat glandular. Leaves oblong-lanceolate, 2–5 cm. long, acutish to rounded at apex, narrow at base to a short petiole or subsessile, crenulate, rugose and green above, cinereous-tomentulose beneath; flowers in dense capitate rather distant whorls forming an interrupted spike; bracts ovate to oblong, cuspidate, 5–10 mm. long, green or tinged with purple; calyx 6–8 mm. long, upper lip tricuspidate, the 3 bristles indicating the tips of the completely united teeth, lower lip composed of 2 distinct spinulose-tipped teeth; corolla pale bluish-lavender, about 12 mm. long, the tube slightly exceeding the lower lip with a narrow band of hairs on the inner surface forming a transverse ring; upper lip 2–3 mm. long, retuse; middle lobe of the lower lip almost as long as the tube, retuse; stamens only slightly exserted, the connective articulate to the filament and about the same length, its lower end evident as a short spur below the articulation.

Dry slopes and hillsides, mainly Upper Sonoran Zone; Contra Costa and Stanislaus Counties, south through the Coast Ranges of central California and southern California to adjacent Lower California. Type locality: probably in the vicinity of Monterey, California. Collected by Douglas. March–Aug.

Salvia mellifera subsp. *jonesii* (Munz) Abrams. (*Salvia mellifera* var. *jonesii* Munz, Bull. S. Calif. Acad. 26: 24. 1927; *S. Munzii* Epling, Madroño 3: 169. 1935.) Lower and more compact habit; leaves shorter, 1–3 cm. long, more obovate; flower-verticils few-flowered, forming a capitate cluster, scarcely over 15 mm. broad; corolla bright blue. In California this subspecies occurs so far as known only on San Miguel Mountain, San Diego County. In Lower California it ranges as far south as the San Pedro Martir Mountains and San Rosario. Type locality: south of Hamilton Ranch, Lower California.

Salvia mellifera subsp. *revoluta* (Brand.) Abrams. (*Audibertia stachyoides* var. *revoluta* Brand. Proc. Calif. Acad. II. 1: 216. 1888; *Salvia mellifera* var. *revoluta* Munz, Bull. S. Calif. Acad. 26: 23. 1927; *S. Brandegei* Munz, op. cit. 31: 69. 1932.) Leaves more loosely woolly beneath, the margins distinctly revolute; corolla lavender, the hairs within the corolla-tube not reduced to a narrow annular band but more widely spaced above the middle; stamens often wholly included on some plants but often exserted in others, according to field observations of Reid Moran. Canyons of Santa Rosa Island, southern California, the type locality.

11. *Salvia eremostachya* Jepson. Desert Sage. Fig. 4413.

Salvia eremostachya Jepson, Man. Fl. Pl. Calif. 870. 1925.

A low much-branched shrub 0.5–1 m. high, the branches ashy-gray with spreading glandular hairs. Leaves deltoid-oblong to linear, 1.5–3.5 cm. long, truncate at base or narrowed to a somewhat margined petiole 3–8 mm. long, crenulate and often revolute on the margins, hispidulous on both sides, bullate above; whorls of the inflorescence mostly 2–3 from an interrupted spike; bracts thin, round-ovate, short-acuminate, glandular and sparingly pilose; calyx to 11 mm. long, upper lip entire or 2–3-spinose, 4–5 mm. long, lower lip with 2 distinct lobes 4.5–5 mm. long; corolla violet-blue or sometimes rose-colored, the tube cylindrical, arcuate, 14–17 mm. long, pubescent within above the middle, lobes of the upper lip 4–6 mm. long, often erose, middle lobe of the lower lip rounded, forked and eroded; stamens attached in the throat, the connective and filament subequal.

Desert slopes, Lower Sonoran Zone; infrequent on the desert slope of the Santa Rosa Mountains, California. Type locality; Indian Canyon, south of Collins Valley, northeastern San Diego County. April–Nov.

12. *Salvia mohavensis* Greene. Mojave Sage. Fig. 4414.

Audibertia capitata A. Gray, Proc. Amer. Acad. 7: 387. 1868. Not *Salvia capitata* Schlecht. 1853.

Salvia mohavensis Greene, Pittonia 2: 235. 1892.

Audibertiella capitata Briq. Bull. Herb. Boiss. 2: 73. 1894.

Ramona capitata Briq. op. cit. 440.

Low compact, much-branched shrub 4–8 dm. high, the leaf-bearing branches mostly 6–15 cm.

long, retrorsely hispidulous and glandular-dotted. Leaves on slender petioles shorter than or about equaling the blades, these oblong-ovate to broadly ovate, acutish to rounded at apex, acutish to subcordate at base, 5–15 mm. long, crenate, strongly rugose and glandular above, conspicuously reticulate-veined and minutely hispidulous beneath; flowers in a terminal head-like verticil; bracts membranaceous and usually whitish, the outer ovate-elliptic, the inner linear-lanceolate, 10–15 mm. long, tomentulose especially on the margins; calyx 8–10 mm. long, teeth of the lower lip distinct, of the upper lip completely united with their tips, sometimes evidenced by 3 minute mucronations; corolla light blue or lavender, 15–20 mm. long; upper lip 3.5 mm. long, 2-lobed to the middle; middle lobe of the lower lip plane, entire, about 5 mm. long; connective of anther shorter than the filament, not produced below the rather prominent articulation.

Rocky desert slopes, Lower Sonoran Zone; Little San Bernardino Mountains, southern California, eastward through the desert range of the southern Mojave Desert to western Arizona and northwestern Sonora. Type locality: Providence Mountains, California. Collected by Cooper. April–July.

13. *Salvia Clevelandii* (A. Gray) Greene. Blue Sage. Fig. 4415.

Audibertia Clevelandii A. Gray, Proc. Amer. Acad. 10: 76. 1874.

Salvia Clevelandii Greene, Pittonia 2: 236. 1892.

Audibertiella Clevelandii Briq. Bull. Herb. Boiss. 2: 73. 1894.

Ramona Clevelandii Briq. op. cit. 440.

A low shrub usually 1 m. or less in height, with a pronounced aromatic odor, the branches usually reddish or purple beneath the rather thin whitish tomentose pubescence. Leaves mostly oblong-elliptic, 1–3 cm. long, rounded or obtuse at apex, narrowed at base to a short petiole, crenate, rugose and rather thinly tomentulose above, densely cinereous-tomentulose beneath; flower-whorls usually solitary, forming a head at the end of the branches, or sometimes 2 or rarely 3 in an interrupted spike; bracts ovate, 7–8 mm. long, hispidulous; calyx 8–10 mm. long, glandular-hispidulous, the 2 teeth of the lower lip free, much shorter than the upper lip, the 3 teeth of this completely united except the mucronate tips; corolla blue, about 20 mm. long, the tube well-exserted, slender, arcuate, upper lip 6–8 mm. long, shallowly 2-lobed, lower lip shorter than the upper, its middle lobe oblong-retuse; connective of the anther about equaling the filament, not prolonged below the articulation.

Rocky hillsides, Upper Sonoran Zone; locally distributed from the Palomar Mountains and Torrey Pines Park, San Diego County, California, to Tecate River, Lower California. Type locality: near Potrero, California. April–July.

14. *Salvia Vaseyi* (Porter) Parish. Vasey's Sage. Fig. 4416.

Audibertia Vaseyi Porter, Bot. Gaz. 6: 207. 1881.

Audibertiella Vaseyi Briq. Bull. Herb. Boiss. 2: 73. 1894.

Ramona Vaseyi Briq. op. cit. 440.

Salvia Vaseyi Parish, Muhlenbergia 3: 126. 1907.

Much-branched rounded shrub, usually 1–1.5 m. high, flowering branches elongate and wand-like, leafy at base, pale gray-green and rather thinly and minutely puberulent. Leaves whitish gray, densely strigose-tomentulose and more or less glandular-dotted, oblong-lanceolate to oblong-ovate, rounded at apex, truncate or subcordate at base, 1–4 cm. long, crenate; petiole 1–2 cm. long; flower-verlicils capitate, several- to many-flowered, usually 5–10 of them rather distantly arranged in an interrupted spike; bracts and calyx-teeth long-spinulose, aristate; corolla white, about 20 mm. long; upper lip suborbicular, retuse at apex; lower lip about two-thirds the length of the tube, its middle lobe subreniform; stamens and style well-exserted; lower end of the connective not prolonged below the articulation.

Dry gravelly or rocky slopes and washes, Lower Sonoran Zone; western edge of the Colorado Desert, from Morongo Canyon, San Bernardino County, California, to northern Lower California. Type locality: Mountain Springs, San Diego County, California. April–June.

15. *Salvia apiana* Jepson. White Sage. Fig. 4417.

Audibertia polystachya Benth. Lab. Gen. & Sp. 314. 1833. Not *Salvia polystachya* Mart. & Gal.

Ramona polystachya Greene, Pittonia 2: 235, 302. 1892.

Audibertiella polystachya Briq. Bull. Herb. Boiss. 2: 73. 1894.

Salvia californica Jepson, Fl. W. Mid. Calif. 460. 1901. Not Brandg. 1889.

Salvia apiana Jepson, Muhlenbergia 3: 144. 1908.

Shrubby below, 1–3 m. high, densely and minutely tomentose-canescens or hoary. Leaves mainly at the base of the erect branches of the season, mostly hoary-tomentose on both surfaces, oblong-lanceolate, 5–8 cm. long, acute or acutish at apex, narrowed at base to a petiole 1–2 cm. long, crenulate; bracts and bractlets small and at length reflexed; flowers in a thyrsoid panicle; calyx 5–6 mm. long, upper lip truncate or shallowly 3-toothed, concave, lower lip shorter, divided into 2 triangular teeth; corolla white, 12–16 mm. long, upper lip very short, lower lip much-enlarged, its middle lobe unguiculate-rounded at apex and erosulate; stamens long-exserted and divaricate; the filiform connective articulate with the filament, its lower end indicated by a minute tooth.

Dry sandy or rocky slopes and benches, Sonoran Zones; Santa Barbara County, southern California south through the cismontane region and the desert slopes of the southern California ranges to northern Lower California. Type locality: near Santa Barbara, California. Collected by Douglas. April–July.

16. *Salvia leucophylla* Greene. Gray Sage. Fig. 4418.

Audibertia nivea Benth. Lab. Gen. & Sp. 313. 1833. Not *Salvia nivea* Thunb.

Salvia leucophylla Greene, Pittonia 2: 236. 1892.

Audibertiella nivea Briq. Bull. Herb. Boiss. 2: 73. 1894.

Ramona nivea Briq. op. cit. 440.

Much-branched shrub, 1-1.5 m. high, whole plant clothed with a whitish gray tomentum, the hairs very short and much-branched. Leaves oblong-lanceolate, 2-5 cm. long, obtuse or rounded at apex, usually subcordate at base, short-petioled, crenulate, rugose above; flower-whorls usually 3-5, forming an interrupted spike, many-flowered, the lower often 3 cm. in diameter; bracts oval or oblong, 8-15 mm. long, often tinged with purple beneath the minute white tomentum; calyx 8-11 mm. long, somewhat cucullate, the orifice very oblique and the teeth suppressed; corolla bluish-lavender, about 2 cm. long; lips subequal, the lower with the middle lobe oblong and plane, 4-5 mm. long, the lateral lobes well-developed; stamens exserted, connective shorter than the filament, the lower end not extending below the articulation.

Dry hillsides, Upper Sonoran Zone; southern California Coast Ranges, vicinity of Pismo, San Luis Obispo County, and Lebec, Kern County, south to the Santa Ana Mountains, Orange County. Type locality: probably in the vicinity of Santa Barbara. Collected by Douglas. April-Aug.

16. *MONÁRDA* L. Sp. Pl. 22. 1753.

Perennial or annual aromatic herbs with erect stems and dentate or serrate leaves. Flowers showy, in dense capitate clusters terminal or also in the upper axils, subtended by often colored bracts and bractlets. Calyx tubular, 15-nerved, about equally 5-toothed, often villous in the throat. Corolla glabrous within, usually glandular or puberulent without, 2-lipped; the upper lip erect or arched, emarginate or entire, the lower 3-lobed, spreading, the middle lobe longer than the others. Antheriferous stamens 2, ascending close under the upper lip, often exserted, the upper pair rudimentary or wanting; anthers linear, the sacs divaricate. Styles 2-cleft at apex; ovary deeply 4-parted. Nutlets ovoid, smooth. [Name in honor of Nicolas Monardes, a Spanish physician and botanist of the sixteenth century.]

A genus of about 12 species, all natives of North America. Type species, *Monarda fistulosa* L.

1. *Monarda pectinàta* Nutt. Plains Lemon Monarda. Fig. 4419.

Monarda pectinata Nutt. Proc. Acad. Phila. II. 1: 182. 1847.

Annual; stems stout, erect, simple or branched, 25-35 cm. high, retrorsely puberulent. Leaves narrowly lanceolate to oblong-lanceolate, 2-4 cm. long, narrowed at base to a short petiole, rather distantly serrulate or subentire, glandular-punctate on both surfaces, puberulent beneath, the uppermost more or less villous-ciliate, at least at base; flowers in dense capitate verticils in the upper axils; bracts pale, lanceolate, 10-12 mm. long, prominently mucronate-aristate, long-ciliate on the margins; calyx puberulent without, densely villous on the throat within, the teeth aristate, about half as long as the tube, often rose-tinted; corolla pink or white, 16-18 mm. long, glandular-punctate and sparsely puberulent without; stamens scarcely equaling the upper lip.

Dry slopes and plains, Upper Sonoran Zone; known within our range only in the New York Mountains, Mojave Desert, California, extending through Arizona and New Mexico to Texas, Colorado, and Nebraska. Type locality: "Near Santa Fé, New Mexico." May-June.

17. *LEPECHINIA* Willd. Hort. Berol. 1: 20, pl. 21. 1806.

Shrubby or suffrutescent aromatic plants, or rarely perennial herbs. Flowers solitary in the axils of the bract-like upper leaves, forming short racemes, or in 2-6-flowered verticils and spicate. Calyx campanulate, subequally 5-toothed, often enlarged in fruit, naked within. Corolla with a broad tube pilose-annulate at base within, 5-lobed, the lobes broad, rounded and plane, erect or nearly so, the upper bifid, the lateral entire and smaller, the lower emarginate. Stamens 4, subequal or didynamous; filaments glabrous; anther-sacs divergent. Nutlets smooth. [Name in honor of Lepechin, a Russian botanist and traveler.]

About 25 species, mostly natives of western South America, two species in California and one in the Hawaiian Islands. Type species, *Horminum caulescens* Ortega.

1. *Lepechinia calýcina* (Benth.) Epling. Pitcher Sage. Fig. 4420.

Sphacele calycina Benth. Lab. Gen. & Sp. 568. 1834.

Sphacele calycina var. *glabella* A. Gray, Bot. Calif. 1: 598. 1876.

Alguelagum calycinum Kuntze, Rev. Gen. Pl. 2: 512. 1891.

Sphacele gracilis Eastw. Zoe 5: 83. 1900.

Sphacele Blochmaniae Eastw. Bull. Torrey Club 30: 495. 1903.

Sphacele calycina var. *gracilis* Jepson, Man. Fl. Pl. Calif. 876. 1925.

Lepechinia calycina Epling ex Munz, Man. S. Calif. 447, 600. 1935.

Low shrubby plant 1-1.5 m. high, more or less villous with branching hairs and glandular-dotted. Leaves ovate to oblong-lanceolate, prominently serrate or crenate-serrate to subentire,



4414



4415



4416



4417



4418



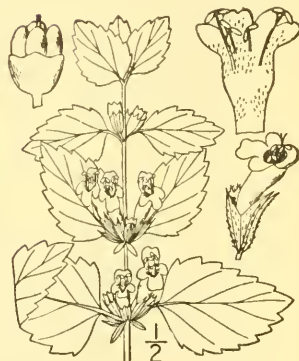
4419



4420



4421



4422

4414. *Salvia mohavensis*
4415. *Salvia Clevelandii*
4416. *Salvia Vaseyi*

4417. *Salvia apiana*
4418. *Salvia leucophylla*
4419. *Monarda pectinata*

4420. *Lepechinia calycina*
4421. *Hedeoma nana*
4422. *Melissa officinalis*

3–9 cm. long, subcordate or truncate to cuneate at base, obtuse or acutish at apex, thin and smoothish in shade, thicker and often strongly net-veined and rugose in exposed environments; flowers solitary in the upper axils, on short pedicels; calyx campanulate, 10–15 mm. long, villous below with forked branched hairs, cleft to about the middle into 5 triangular or triangular-lanceolate teeth, somewhat enlarged and slightly membranous in fruit; corolla purplish-blotched and -veined, 25–30 mm. long and half as broad.

Canyons and hillsides, Upper Sonoran and Transition Zones; Santa Rosa, Santa Cruz, and Santa Catalina Islands; and in the California Coast Ranges from Lake and Sonoma Counties to Ventura County, and in the Sierra Nevada foothills from Butte County to Mariposa County. Type locality: California. Collected by Douglas. April–June.

Lepechinia fràgrans (Greene) Epling, Brittonia 6: 362. 1948. (*Sphacele calycina* var. *Wallacei* A. Gray, Bot. Calif. 1: 598. 1876; *S. fràgrans* Greene, Pittonia 1: 38. 1887; *S. cordifolia* Gandoger, Bull. Soc. Bot. Fr. 65: 68. 1918; *Lepechinia calycina* var. *Wallacei* Epling in Munz, Man. S. Calif. 447. 1935.) Characterized by the deltoid or subhastate leaves, conspicuously dense villous-tomentose herbage and membranous, lanceolate calyx-teeth. Canyons, Upper Sonoran Zone; Santa Rosa, Santa Cruz and Santa Catalina Islands and occasionally in the San Gabriel and Santa Monica Mountains on the mainland of southern California. Type locality: Los Angeles.

Lepechinia cardiophylla Epling, loc. cit. Leaves strongly cordate at base, broadly ovate; calyx-teeth broadly triangular, shorter than the calyx-tube. Santa Ana Mountains, at 3,000–4,000 feet altitude, Orange County, California. Type locality: Indian Canyon.

Lepechinia Gánderi Epling, op. cit. 363. Leaves glabrous above, puberulent below, narrowed toward the base; calyx-teeth acicular, rigid, nearly equaling the calyx-tube. Otay Mountain, San Diego County, California, and probably extending into adjacent Lower California. Type locality: Otay Mountain, 3,000 feet altitude.

18. HEDEOMA Pers. Syn. Pl. 2: 131. 1807.

Annual or perennial, strongly aromatic herbs. Leaves small, entire or toothed, sessile or short-petioled. Flowers small, blue or purple, in small cymes or solitary in the axils of the upper leaves. Calyx tubular, 13-nerved, 5-toothed and more or less 2-lipped, the upper 3 teeth united below the middle, the lower 2 distinct and a little longer than the upper. Corolla 2-lipped, the upper lip erect, entire, emarginate or 2-lobed, the lower 2-cleft. Anther-bearing stamens 2, ascending under the upper lip, the 2 sterile stamens reduced to staminodia or wanting. Style 2-cleft at apex, glabrous. Nutlets ovoid, smooth. [Name Greek, meaning sweet odor.]

An American genus of about 25 species. Type species, *Melissa pulegioides* L.

1. *Hedeoma nana* (Torr.) Briq. Dwarf Pennyroyal. Fig. 4421.

Hedeoma dentata var. *nana* Torr. Bot. Mex. Bound. 130. 1859.

Hedeoma thymoides A. Gray, Syn. Fl. N. Amer. 2: 362. 1878. Not Pers. 1807.

Hedeoma nana Briq. in Engler & Prantl, Nat. Pflanzenf. 4^{9a}: 294. 1897.

Low tufted perennial, much-branched from a simple or somewhat branched woody root crown, 10–20 cm. high, herbage pale green or sometimes purple-tinged; stems slender, puberulent with short retrorse hairs. Leaves ovate to oblong-ovate, 4–8 mm. long, entire, short-petioled, glabrate above, rather sparsely puberulent and glandular-dotted beneath; upper axils with 1 or 2 short, minutely branched peduncles, each bearing 1–2 short-pedicelled flowers; calyx tubular, 5–6 mm. long, including the subulate-aristate teeth, becoming slightly restricted at throat, and somewhat gibbous below on the lower side, short-pubescent with spreading and slightly curved upward hairs; corolla 7–8 mm. long, light purple, the lower lip with a white blotch, purple-lined.

Desert slopes, often in rock crevices, Lower Sonoran Zone; in California known only from the following mountain ranges of the Mojave Desert: Kingston, Providence, and Clark. These plants have been segregated out as subspecies *californica* W. S. Stewart, Rep. Spec. Nov. Beih. 115: 29. 1939. The typical species is more loosely branched and usually more densely covered with slightly longer pubescence. It ranges from Arizona and Nevada to western Texas and adjacent Mexico, and the original or type specimens were collected on the rocky banks of the Rio Grande, near El Paso, Texas. April–June.

19. MELÍSSA [Tourn.] L. Sp. Pl. 592. 1753.

Herbs with broad dentate leaves and rather small white or yellowish flowers in axillary clusters. Calyx tubular-campanulate, declined in fruit, 13-nerved, nearly naked in the throat, bilabiate, upper lip 3-toothed, flat, the lower 2-parted. Corolla-tube exserted, curved-ascending, enlarged above, glabrous within; limb bilabiate, upper lip emarginate, erect, the lower spreading 3-lobed. Stamens 4, didynamous, ascending under the upper lip of the corolla; anther-sacs divaricate. Style 2-cleft, the lobes subulate. Nutlets ovoid, smooth. [Name Greek, meaning bee.]

A genus of about 4 species, inhabiting Europe and western Asia. Type species, *Melissa officinalis* L.

1. *Melissa officinalis* L. Garden or Lemon Balm. Fig. 4422.

Melissa officinalis L. Sp. Pl. 592. 1753.

Lemon-scented perennial, with rather stout, erect or ascending stems, 4–8 dm. high, puberulent, the branchlets, leaves and calyces also more or less villous. Leaves ovate, petioled, obtuse to subcordate at base, obtuse or acutish at apex, 2–8 mm. long, coarsely crenate-dentate or den-

tate; flowers few in the axillary clusters, short-pedicelled; calyx about 6 mm. long; corolla white or faintly tinged with lavender, 10–14 mm. long.

Waste places and open woods, Transition and Upper Sonoran Zones; western Washington and Oregon to central California. Naturalized from Europe. June–Sept.

20. SATURËJA L. Sp. Pl. 567. 1753.

Perennial herbs or suffrutescent plants with entire or toothed leaves. Flowers solitary in the axils or in few-flowered axillary clusters. Calyx cylindric or narrowly campanulate, 5-toothed, and usually 13–15-nerved in our species. Corolla small, little-exserted, or showy and well-exserted; upper lip erect, 2-lobed; lower lip spreading 3-lobed. Stamens 4, all perfect, ascending under the upper lip and included or little-exserted. Styles glabrous or hairy. Nutlets ovoid, smooth. [Ancient Latin name.]

A large and diversified genus of about 150 species, widely distributed in all the continents. Type species, *Satureja hortensis* L. This is Summer Savory of herb gardens and in horticulture is often called *Calamintha hortensis*.

Flowers white or white tinged with purple, 6–8 mm. long; herbage not villous.

Trailing, with evergreen glabrous or nearly glabrous leaves; flowers solitary in the axils.

1. *S. Douglasii*.

Erect, branching and shrubby; leaves grayish-puberulent on both sides.

2. *S. Chandleri*.

Flowers orange, 3–4 cm. long; stems stout, erect, entirely herbaceous; herbage conspicuously villous.

3. *S. mimuloides*.

1. *Satureja Douglasii* (Benth.) Briq. Yerba Buena. Fig. 4423.

Thymus Douglasii Benth. *Linnaea* 6: 80. 1831.

Thymus Chamissonis Benth. loc. cit.

Micromeria Douglasii Benth. *Lab. Gen. & Sp.* 372. 1834.

Micromeria Chamissonis Greene, *Man. Bay Reg.* 289. 1894.

Satureja Douglasii Briq. in Engler & Prantl, *Nat. Pflanzenf.* 4^{3a}: 300. 1897.

Trailing aromatic perennial, the stems slender, often rooting. Leaves evergreen, ovate, 15–25 mm. long, obtuse to subcordate at base, obtuse at apex, rather shallowly crenate or crenate-serrate, glabrous above, glandular-dotted and sparsely puberulent especially on the veins beneath and on the petioles; flowers solitary in the axils; pedicels slender, mostly 10–15 mm. long, with a pair of small slender bracteoles below the middle; calyx tubular, 4 mm. long, 12–15-ribbed, puberulent, the hairs recurved at the apex; corolla white or more or less tinged with purple, pubescent without and on the throat within, 6–8 mm. long.

Woods, mainly Humid Transition Zone; Vancouver Island to northern Idaho, south, west of the Cascades and the Sierra Nevada, to Los Angeles County, California. Type locality: California. April–Oct.

2. *Satureja Chandleri* (Brandg.) Druce. San Miguel *Satureja*. Fig. 4424.

Calamintha Chandleri Brandg. *Zoe* 5: 195. 1905.

Satureja Chandleri Druce, *Rep. Bot. Exch. Cl. Brit. Isles* 1916: 644. 1917.

Stems frutescent, branching, forming clumps about 1 m. high, the seasonal branches pubescent. Leaves orbicular-ovate, 1–2 cm. long, short-petioled, shallowly crenate or entire, villous-pubescent beneath, puberulent above with short curved hairs; flowers in axillary clusters of 1–5, on short peduncles; pedicels 1–2 mm. long; calyx tubular-campanulate, 7–8 mm. long, including the ovate-lanceolate teeth; corolla cream-white, pubescent without, tube 6–7 mm. long, upper lip 2–3 mm. long, erect, the lower 3–4 mm. long, 3-lobed, spreading; style somewhat exserted, pubescent.

Dry hillsides and canyons, Sonoran Zones; southwestern San Diego County (San Miguel Mountain, and canyon near Murietta), California, and adjacent Lower California. Type locality: San Miguel Mountain, San Diego County. April–June.

3. *Satureja mimuloides* (Benth.) Briq. Mimulus-like *Satureja*. Fig. 4425.

Calamintha mimuloides Benth. *Pl. Hartw.* 331. 1849.

Clinopodium mimulodes Kuntze, *Rev. Gen. Pl.* 2: 515. 1891.

Satureja mimuloides Briq. in Engler & Prantl, *Nat. Pflanzenf.* 4^{3a}: 302. 1897.

Perennial herb, the stems stout, erect, simple or branched, 8–15 dm. high, herbage soft-villous and glandular-pubescent, leafy throughout. Leaves ovate, 4–6 cm. long, on petioles of about half their length, coarsely serrate-dentate, the uppermost smaller, ovate-lanceolate and entire; flowers solitary in the axils on pedicels 15–25 mm. long, often with 2–3 additional short-pedicelled flowers in some of the axils; calyx tubular-campanulate, 13–15-nerved, the teeth subulate with a low triangular base; corolla orange or tinged with crimson, 3–4 cm. long, sparsely pubescent without; upper lip erect, about 1 cm. long, 2-cleft; lower lip spreading, 3-lobed, the middle lobe broader than the lateral ones; anthers sparsely pubescent; style exceeding the upper lip, glabrous.

Creek banks and canyons, Upper Sonoran Zone; Monterey County to the San Gabriel Mountains, Los Angeles County, California. Type locality: in shady places along the Carmel River, Monterey County. Collected by Hartweg. June–Oct.

21. POGÓGYNE Benth. *Lab. Gen. & Sp.* 414. 1834.

Small aromatic annual herbs with obovate to spatulate leaves and bracteate verticillate flowers forming dense terminal spikes or the lower verticils distant, the bracts and

calyces hirsute-ciliate or glabrate. Calyx deeply 5-cleft, the two lower teeth longer, the tube mostly 15-nerved, glabrous within. Corolla blue or purple, the tube exserted, tubular-funnelform; upper lip erect, entire, lower spreading, 3-lobed. Stamens 4, all antheriferous, or the upper pair sterile, ascending under the upper lip; filaments pubescent. Style slightly exserted, bearded. [Name Greek, meaning bearded and female, in reference to the bearded style.]

A California genus of about 4 species. Type species, *Pogogyne Douglasii* Benth.

All 4 stamens bearing fertile anthers; style densely pubescent below stigma-lobes.

Floral bracts and calyx-lobes conspicuously hirsute and bristly ciliate.

1. *P. Douglasii*.

Floral bracts and calyx-lobes glabrous or nearly so.

2. *P. nudiuscula*.

Only the lower pair of stamens bearing fertile anthers, the upper filaments with or without rudimentary anthers sometimes completely suppressed.

Stems generally prostrate or spreading, slender; corolla 2.5–5 mm. long; nutlets 1 mm. long.

3. *P. serpylloides*.

Stems erect or essentially so, generally robust; corolla 4–8 mm. long; nutlets 1.7–2.5 mm. long.

4. *P. zizyphoroides*.

1. *Pogogyne Douglasii* Benth. Douglas' *Pogogyne*. Fig. 4426.

Pogogyne Douglasii Benth. Lab. Gen. & Sp. 414. 1834.

Pogogyne multiflora Benth. loc. cit.

Pogogyne Douglasii subsp. *ramosa* J. T. Howell, Proc. Calif. Acad. IV. 20: 116. 1931.

Pogogyne Douglasii subsp. *minor* J. T. Howell, loc. cit.

Stems erect, simple or branching below, 5–45 cm. high, glabrous or puberulent. Leaves 1–2 cm. long, narrowly oblanceolate to elliptic, mostly obtuse, entire or shallowly and remotely toothed, usually obtuse, attenuate below to a broad petiole; inflorescence in a dense spike or the lower verticils distinct, 1–3 cm. broad; bracts linear to oblanceolate, mostly pungent at apex, densely conspicuously bristly ciliate on the margins; calyx 8–12 mm. long, the lower teeth 1.5–2.5 times as long as the tube, the upper shorter, ciliate on the margin, the tube glabrous or puberulent; corolla 1–2 cm. long, lavender or purple, the palate of the lower lip often mottled with pale yellow; fertile stamens 4, anthers and upper part of filament pubescent; style a little exceeding corolla, pubescent for 2–6 mm. below the lobes; nutlets obovoid, brown.

Low ground, especially in dry beds of winter pools, Upper Sonoran Zone; Lake and Butte Counties, south to Kern and San Luis Obispo Counties, California. Type locality: California. Collected by Douglas. May–July.

Pogogyne Douglasii subsp. *parviflora* (Benth.) J. T. Howell, Proc. Calif. Acad. IV. 20: 117. 1931. (*Pogogyne parviflora* Benth. Lab. Gen. & Sp. 414. 1834.) Inflorescence subcapitate; bracts oblanceolate to linear; lower calyx-lobes relatively stouter, only 1–1.5 times the length of tube; corolla 11–15 mm. long; style hairy 4 mm. below stigma-lobes. Low places in the valleys of North Coast Ranges, Mendocino, Lake and Sonoma Counties, California. Type locality: "Hab. in California septentrionali." First collected by Douglas.

2. *Pogogyne nudiuscula* A. Gray. San Diego *Pogogyne*. Fig. 4427.

Pogogyne nudiuscula A. Gray, Bot. Calif. 1: 597. 1876.

Stems 1–3 dm. high, simple or branching from the base, erect or somewhat spreading. Leaves broadly to narrowly oblanceolate, 1–2 cm. long, narrowed to a petiole about as long as the blade, obtuse or acute, entire or nearly so, glabrous; inflorescence a short subcapitate spike usually with 1 to several rather distinct verticils below; bracts oblanceolate to linear-oblanceolate, glabrous or sparsely ciliate on the margins; calyx-tube 3–4 mm. long, glabrous or very sparsely pubescent, strongly nerved; lower calyx-lobes 3–5 mm. long, margins of the lobes smooth or thinly ciliate; corolla 11–14 mm. long, lavender, sparsely pubescent outside; all 4 stamens fertile, the lower pair 5–6 mm. long, glabrous; upper pair 2–3 mm. long, pubescent; style pubescent, 1–4 mm. below the stigma-lobes.

Dry bottoms of winter pools, Lower Sonoran Zone; mesas in the vicinity of San Diego, California. Type locality: San Diego. May–June.

Pogogyne Abrámsii J. T. Howell, Proc. Calif. Acad. IV. 20: 119. 1931. Similar to *P. nudiuscula* A. Gray, floral bracts and calyx-lobes conspicuously hirsute and bristly ciliate. Mr. Howell's field notes on his specimen (6636) read in part as follows: "upper lip of limb cucullate, the lobes of the lower lip reflexed; limb and throat rich rosy-purple, tube white; middle lobe of lower lip with central yellow area spotted with deep purple." Dried bottoms of winter rain pools, on mesas north of San Diego, California. Type locality: mesa five to six miles north of San Diego. April–June.

This species is a close relative of *P. nudiuscula* and possibly not specifically distinct. However, although both species grow in the same general region no one has reported them as growing together and no intermediate forms have been noted.

3. *Pogogyne serpylloides* (Torr.) A. Gray. Thyme-like *Pogogyne*. Fig. 4428.

Hedeoma ? *serpylloides* Torr. Pacif. R. Rep. 4: 123. 1857.

Pogogyne serpylloides A. Gray, Proc. Amer. Acad. 7: 386. 1868.

Hedeomoides serpylloides Briq. in Engler & Prantl, Nat. Pflanzenf. 4^{3a}: 295. 1897.

Stems slender, diffusely spreading from the base or rarely simple and erect in diminutive plants, 3–25 cm. long, retrorsely puberulent. Leaves oblanceolate to oblong-obovate, narrowed to a petiole about equaling the blade, 5–10 mm. long, entire, glabrate or those subtending the verticils short-ciliate toward the base; inflorescence usually of several distinct lower verticils and two or more upper ones crowded into a short subcapitate spike; floral bracts equaling or exceeding the calyx, spatulate to linear-oblanceolate, somewhat ciliate on the margins; calyx-tube 1–3.5 mm. long, thinly pubescent in the nerves, lower teeth 2–4 mm. long, the upper 1.5–3 mm., ciliate on the margins; corolla 3–5 mm. long, lavender; lower pair of stamens fertile,

the upper sterile or wanting; style about equaling the corolla-throat, slightly pubescent below the stigma-lobes; nutlets rotund-ovoid, 1-1.3 mm. long.

Hillsides and valleys, Upper Sonoran Zone; California Coast Ranges from Humboldt and Lake Counties to San Luis Obispo, and in the foothills of the Sierra Nevada. Type locality: hillsides, Martinez, Contra Costa County, California. April-June.

4. *Pogogyne zizyphoroides* Benth. Sacramento Pogogyne. Fig. 4429.

Pogogyne zizyphoroides Benth. Pl. Hartw. 330. 1849.

Hedeomoides zizyphoroides Briq. in Engler & Prantl, Nat Pflanzenf. 48^a: 295. 1897.

Stems simple or branched, erect or somewhat spreading, 2-20 cm. high. Leaves 15-20 mm. long, ovate to elliptic, narrowed to a slender petiole about equaling the blade, the lower glabrous, suffrutescent, bristly conspicuously ciliate on the margins of the petioles and lower part of the blade; inflorescence a short, subcapitate spike, or in vigorous specimens, these subtended by 2-3 distinct verticils; floral bracts equaling or exceeding the calyx, spatulate to narrowly oblanceolate, conspicuously ciliate on the margins; calyx-tube 3-5 cm. long, glabrous or rarely bristly on the nerves; lower calyx-lobes 3-6 mm. long, the upper a little shorter, all bristly on the margins and the nerves; corolla lavender, 4-8 mm. long; lower pair of stamens fertile, the upper pair sterile and clavate; nutlets obovoid, dark brown, 1.6-2.5 mm. long.

Dry beds of winter pools, frequently alkaline soils, Upper Sonoran Zone; Jackson County, Oregon, to the San Francisco Bay Region and the lower San Joaquin Valley. Type locality: "In valle Sacramento." Collected by Hartweg. March-May.

22. *ORÍGANUM* [Tourn.] L. Sp. Pl. 588. 1753.

Perennial herbs or some species shrubby, with fairly small entire or toothed leaves. Flowers small, pink or purplish, in dense terminal glomerules, bracteate. Calyx campanulate or ovoid, about 13-nerved, 5-toothed and more or less 2-lipped, villous in the throat. Corolla 2-lipped, the upper lip erect, emarginate or 2-lobed, the lower spreading, 3-cleft; tube straight, usually pubescent in the throat. Stamens 4, didynamous, ascending; anther-sacs divergent. Style 2-cleft at the summit. Nutlets ovoid or oblong, smooth. [Name Greek, meaning mountain joy.]

An Old World genus of about 30 species. Type species, *Origanum vulgare* L.

1. *Origanum vulgare* L. Wild Marjoram. Fig. 4430.

Origanum vulgare L. Sp. Pl. 590. 1753.

Perennial from nearly horizontal rootstocks, villous-pubescent with more or less curved hairs; stems rather slender, erect or somewhat decumbent, 3-8 dm. high. Leaves petioled, ovate, obtuse or acutish at apex, rounded at base, entire or obscurely denticulate, 2-3 cm long, often with smaller ones in the axils or on short axillary branches; flower-cluster often cymose at the apex, 3-5 cm. broad; bracts usually purplish, ovate to oval, about 3 mm. long; calyx 2.5-3 mm. long, the 5 teeth about equal, short, conspicuously ciliate on the margin; corolla purple, varying to pink or white, 5-6 mm. long, the lobes of the lips rounded; style and the two longer stamens exserted.

Borders of woods or thickets, locally naturalized from Europe; western Oregon (Clackamas County) and California Coast Ranges (Santa Cruz Mountains). Aug.-Oct.

23. *MONARDÉLLA* Benth. Lab. Gen. & Sp. 331. 1834.

Aromatic annual or perennial herbs, with small entire or serrate leaves. Flowers borne in terminal heads subtended by broad often colored bracts. Calyx tubular, about equally 5-toothed, the tube usually 15-nerved, glabrous in the throat; upper lip erect, 2-cleft, the lower 3-parted, all the lobes linear to narrowly oblong. Stamens 4, distinct and straight, exserted; anther-cells strongly or moderately divergent. Style unequally 2-cleft at apex. Nutlets broadly oblong, smooth. [Name diminutive of *Monarda* because of the resemblance to that genus.]

A genus of about 20 species, inhabiting western United States and adjacent Mexico, but predominantly Californian. Type species, *Monardella odoratissima* Benth.

Flowers in rather loose heads, scarlet or yellow; calyx 12-28 mm. long; corolla-tube well-exserted, much longer than the lobes; pollen-sacs strongly divaricate; perennials. (*Macranthae*.)

Corolla-tube narrowly funnelform; calyx 3-4 mm. wide; anthers 1.25 mm. long; corolla scarlet or yellowish in one variety. 1. *M. macrantha*.

Corolla-tube narrowly cylindric, commonly yellow, scarcely over 1 mm. wide; calyx 2 mm. wide; anthers 0.7. long; corolla commonly yellow. 2. *M. nana*.

Flowers in dense heads, rose-purple to white; calyx 5-10 mm. long; corolla-tube not long-exserted, but little longer than its lobes; pollen-sacs not strongly divaricate; annuals or perennials. (*Pycnanthae*.)

Perennials, usually woody at the base.

Leaves plane, not undulate or crisped on the margins.

Plants low caespitose dwarfs, usually not over 6 cm. high, densely cinereous-pubescent; leaves 4-7 mm. long, usually denticulate. 3. *M. cinerea*.

Plants taller, variously pubescent or glabrate; leaves normally over 1 cm. long and usually entire except in *M. villosa*.

Bracts herbaceous and more or less foliar and reflexed; leaves more or less villous and usually serrulate. 4. *M. villosa*.

- Bracts erect, firm or membranous, not foliar; leaves entire.
 Bracts firm and green or often more or less purplish.
 Leaves with a dense felt-like tomentum beneath, thick and somewhat coriaceous, revolute on the margins.
 Upper surface of the leaves glabrous. 5. *M. hypoleuca*.
 Upper surface of the leaves lanate. 6. *M. lanata*.
 Leaves glabrous or pubescent but not densely felt-like beneath, margins plane or only slightly revolute.
 Upper surface of leaves glabrous. 7. *M. saxicola*.
 Upper surface of leaves pubescent. 8. *M. viridis*.
 Bracts membranaceous, either purple or nearly white.
 Stems and leaves glabrate or variously pubescent but not silvery-puberulent.
 Plants strictly glabrous and shining; leaves narrowly oblong. 9. *M. purpurea*.
 Plants more or less villous or puberulent with multicellular hairs, if glabrate not shining but sometimes glaucous.
 Stems and leaves glabrous or commonly puberulent. 10. *M. odoratissima*.
 Stems and leaves rather densely villous with spreading hairs. 11. *M. Robinsonii*.
 Stems and leaves silvery with a dense minute puberulence. 12. *M. linoides*.
 Leaves strongly undulate, appearing as if lobed. 13. *M. crispa*.
 Annuals.
 Leaves strongly undulate-margined, appearing as if lobed; corolla rose-purple. 14. *M. undulata*.
 Leaves plane, entire.
 Bracts with the lateral veins curving upward more or less paralleling the midvein.
 Bracts not white; calyx-teeth not white-tipped; corolla purple, rarely white.
 Bracts puberulent.
 Bracts acute, the interstices with numerous evident veinlets. 15. *M. lanceolata*.
 Bracts abruptly acuminate, veinlets in the interstices lacking or inconspicuous. 16. *M. Breweri*.
 Bracts villous, abruptly acuminate, veinlets inconspicuous except in the outer interstices. 17. *M. Pringlei*.
 Bracts white or white-margined; calyx-teeth white or tipped with white; corolla white.
 Calyx-teeth erect, triangular-lanceolate; stamens exserted.
 Bracts acute, narrowly white-margined; calyx 13-nerved. 18. *M. candicans*.
 Bracts abruptly acuminate with conspicuous white tips; calyx 15-nerved. 19. *M. exilis*.
 Calyx-teeth divergent, subulate; bracts wholly white; stamens included. 20. *M. leucocephala*.
 Bracts with the lateral veins diverging almost at right angles to the midrib connecting with the prominent marginal vein; interstices with very thin almost transparent membrane. 21. *M. Douglasii*.

1. *Monardella macrantha* A. Gray. Large-flowered *Monardella*. Fig. 4431.

Monardella macrantha A. Gray, Proc. Amer. Acad. 11: 100. 1876.

Madronella macrantha Greene, Leaflets Bot. Obs. 1: 169. 1906.

Stems slender, woody at base, branching from a slender creeping rootstock, 2-5 dm. high, pubescent or puberulent with more or less recurved hairs. Leaves ovate to elliptic, 1-2 cm. long, on petioles half their length, entire or rarely faintly serrate, nearly or quite glabrous; bracts equaling or shorter than the calyx, more or less membranaceous and colored, ciliate-villous on the margins; flowers 10-20 in a head; calyx usually over 2 cm. long, villous at base, glandular-pubescent throughout, teeth 4 mm. long, subulate; corolla 3-4 cm. long, slender-funnelform, scarlet or tinged with yellow, minutely and sparsely pubescent without; stamens well-exserted beyond the corolla-lobes; anthers 1.25 mm. long.

Rocky or sandy soils, Arid Transition Zone; Santa Lucia Mountains, Monterey County, and the San Gabriel Mountains, Los Angeles County, California, south to the Sierra San Pedro Martir, Lower California. Type locality: "on the Cuamaca Mountains and near Julian City," San Diego County. June-Aug.

Monardella macrantha subsp. *Hallii* Abrams. (*Monardella macrantha* var. *Hallii* Abrams, Muhlenbergia 8: 29. 1912.) Herbage densely villous-pubescent throughout; calyx long-villous and glandular-pubescent; corolla frequently yellowish. San Bernardino, San Jacinto and Palomar Mountains, southern California. Type locality: Palomar Mountains.

2. *Monardella nana* A. Gray. Yellow *Monardella*. Fig. 4432.

Monardella nana A. Gray, Proc. Amer. Acad. 11: 101. 1876.

Monardella macrantha var. *nana* A. Gray, Syn. Fl. N. Amer. ed. 2. 21: 459. 1886.

Madronella nana Greene, Leaflets Bot. Obs. 1: 169. 1906.

Stems branching from a slender woody rootstock, 15-30 cm. long, retrorsely pubescent. Leaves ovate, 15-20 mm. long, green and sparingly pubescent above; bracts narrowly ovate, 15-20 mm. long, membranaceous, pale tinged with purple; calyx 12-15 mm. long, 2 mm. broad, villous and glandular-pubescent, the teeth subulate, 3 mm. long; corolla cream-colored to pale rose, its tube narrowly cylindric, 15-18 mm. long and 1.5 mm. broad, conspicuously pubescent; corolla-lobes 5-6 mm. long, equaled by the longer pair of stamens; filaments very slender; anthers small, only 0.7 mm. from tip to tip of the widely divergent sacs.

Coniferous forest and upper chaparral belt, Arid Transition and Upper Sonoran Zones; Cuyamaca and

Laguna Mountains, San Diego County, California, and in the adjacent Sierra Laguna Hansen, Lower California. Type locality: near Talley's, Cuyamaca Mountains. Collected by Cleveland. June-July.

Monardella nana subsp. *leptosiphon* (Torr.) Abrams. (*Monardella villosa* var. *leptosiphon* Torr. Bot. Mex. Bound. 129. 1859; *M. nana* var. *leptosiphon* Abrams, Muhlenbergia 8: 31. 1912.) Stems and leaves villous-pubescent with spreading hairs; corolla-tube 20-25 mm. long, 1 mm. wide; corolla-lobes 1 cm. long, exceeding the stamens. Open coniferous forests and chaparral, Palomar Mountains, San Diego County, California. Type locality: "San Felipe," probably in the mountains west of San Felipe canyon along the old San Diego-Fort Yuma road.

Monardella nana subsp. *tenuiflora* (S. Wats.) Abrams. (*Monardella tenuiflora* S. Wats. ex A. Gray, Proc. Amer. Acad. 7: 230. 1882; *M. nana* var. *tenuiflora* Abrams, Muhlenbergia 8: 32. 1912.) Stems about 1 dm. high, cinereous with close recurved pubescence; leaves ovate to elliptic, 15 mm. or less in length, puberulent above with upwardly curved hairs; corolla-tube very slender, less than 1 mm. wide, about 20 mm. long; corolla-lobes about 6 mm. long, acute. Yellow pine forests, Arid Transition Zone; San Jacinto Mountains, Riverside County, California. Type locality: San Jacinto Mountains.

Monardella nana subsp. *arida* (Hall) Abrams. (*Monardella macrantha* var. *arida* Hall, Univ. Calif. Pub. Bot. 1: 111. pl. 10. 1902; *M. nana* var. *arida* Abrams, Muhlenbergia 8: 33. 1912.) Stems and leaves cinereous throughout with a close puberulence; stems short, usually less than 1 dm. long; leaves crowded, usually less than 1 cm. long, rather thick and often curved, lateral veins not evident; bracts white, tinged with rose; corolla white or cream-colored; tube scarcely over 0.5 mm. thick, 15-20 mm. long; lobes mostly less than 5 mm. long. Rocky desert slopes, Upper Sonoran Zone; desert slope of the San Jacinto and Santa Rosa Mountains, mostly between 4,000 and 5,000 feet altitude, Riverside County, California. Type locality: "In the desert region to the southeast of San Jacinto Mt., along Coyote Creek, at 5000 ft. alt."

3. *Monardella cinerea* Abrams. Gray *Monardella*. Fig. 4433.

Monardella cinerea Abrams, Muhlenbergia 8: 33. 1912.

Stems freely branching, slightly woody at base, 5-10 cm. long, cinereous. Leaves sessile, 5-8 mm. long, broadly ovate-triangular, obtuse at apex, abruptly rounded at base, denticulate, cinereous on both surfaces with soft-villous tomentum; floral pair of leaves similar, closely subtending the head; bracts broadly ovate, acute or obtuse, 8 mm. long, purple, sparsely villous-pubescent; heads 15-20 mm. broad, many-flowered; calyx 7 mm. long, villous-pubescent and glandular, purple above; teeth subulate, 2 mm. long; corolla lavender, its tube not exerted, its lobes 4 mm. long; lower pair of stamens slightly exceeding the corolla-lobes, a third longer than the upper pair.

Rocky ridges, Arid Transition and Canadian Zones; Mount San Antonio (Old Baldy) and summits of neighboring ridges, San Gabriel Mountains, southern California. Type locality: Mount San Antonio, at about 9,000 feet altitude. July-Aug.

4. *Monardella villosa* Benth. Coyote Mint. Fig. 4434.

Monardella villosa Benth. Bot. Sulph. 42. pl. 21. 1844.

Monardella globosa Greene, Pittonia 5: 82. 1902.

Monardella involucreata Heller, Muhlenbergia 1: 34. 1904.

Madronella villosa Greene, Leaflets Bot. Obs. 1: 168. 1906.

Flowering stems several from the branching woody base, mostly simple or often with a few short ascending branches, 1-6 dm. high, villous-pubescent. Leaves round-ovate to narrowly ovate, entire or unevenly serrate, 1-2 cm. long, dark green and thinly pubescent above, paler beneath and more or less villous-pubescent, petiole slender, about half as long as the blade; heads globose, 15-20 mm. broad, often closely subtended by 1 or 2 pairs of true leaves; bracts ovate to ovate-lanceolate, 6-9 mm. long, usually purplish, pinnately veined, villous-pubescent on both surfaces; calyx 7-8 mm. long, glandular-villous, densely so on the teeth; corolla purple, varying to pink or almost white, the tube slightly exerted, pubescent without, lobes narrowly linear, 4-5 mm. long, glabrous or sparsely hairy.

Rocky ridges or gravelly flats, Upper Sonoran and Transition Zones; California Coast Ranges from Humboldt County to San Luis Obispo County, California. Type locality: Bodega Bay, California. June-Aug.

Monardella villosa var. *franciscana* (Elmer) Epling, Ann. Mo. Bot. Gard. 12: 48. 1925. (*Monardella franciscana* Elmer, Bot. Gaz. 41: 320. 1906.) Stems villous and especially the upper parts tomentose; leaves broadly ovate to suborbicular, thick, truncate to subcordate at base, villous above, tomentose and canescent beneath. Near the coast from Point Reyes to San Simeon Bay, California. Type locality: San Pedro, San Mateo County, California.

Monardella villosa subsp. *subseriata* (Greene) Epling, loc. cit. (*Monardella subseriata* Greene, Pittonia 5: 81. 1902; *M. tomentosa* Eastw. Bull. Torrey Club 30: 496. 1903; *M. mollis* Heller, Muhlenbergia 1: 35. 1904.) Stems villous to villous-tomentose especially on the upper internodes. Leaves lanceolate or ovate-lanceolate, mostly 2-2.5 cm. long, entire or with a few shallow serrations, soft villous-tomentose, often densely so beneath; corolla 11-18 mm. long. Dry ridges, Upper Sonoran and Arid Transition Zones; southwestern Oregon from Roseburg to the Rogue River Valley, also in the California Coast Ranges from Mendocino County to Monterey County, and the Sierra Nevada foothills from Amador County to Tuolumne County. Type locality: Sonoma County, California.

Monardella villosa subsp. *Sheltonii* (Torr.) Epling, op. cit. 50. (*Monardella Sheltonii* Torr. Journ. Acad. Phila. II. 3: 99. 1855; *M. villosa* var. *glabella* A. Gray, Bot. Calif. 1: 593. 1876; *M. reflexa* Howell, Fl. N.W. Amer. 549. 1901; *M. coriacea* Heller, Muhlenbergia 1: 35. 1904.) Stems puberulent or glabrous. Leaves narrowly ovate to ovate-lanceolate, puberulent or nearly glabrous, entire or obscurely serrate, narrowed at base to a short petiole; bracts lanceolate, reflexed, short-pubescent, entire or ciliate on the margins. Southern Oregon in Curry, Josephine, Jackson, and Klamath Counties, south in the Coast Ranges to Monterey County and in the Sierra Nevada to Fresno County, California. Type locality: Nevada City, Nevada County, California.

Monardella villosa subsp. *neglecta* (Greene) Epling, op. cit. 52. (*Monardella neglecta* Greene, Pittonia 5: 82. 1902; *Madronella neglecta* Greene, Leaflets Bot. Obs. 1: 169. 1906.) Stems puberulent to pubescent on the upper internodes. Leaves ovate to oblong, 1-1.5 cm. long, tapering at base to a short petiole; bracts ovate, acute, membranaceous, only the outer foliaceous and reflexed, the innermost purple, pubescent to glabrous, ciliate on the margins. A variable plant peculiar to the Coast Ranges of central California (Marin County, San Mateo County, in Mount Hamilton range, California). Type locality: Marin County, California.

5. *Monardella hypoleuca* A. Gray. Thick-leaved Monardella. Fig. 4435.

Monardella hypoleuca A. Gray, Syn. Fl. N. Amer. 2¹: 356. 1878.

Monardella robusta Elmer, Bot. Gaz. 39: 46. 1905.

Suffrutescent perennial, 2–5 dm. high, simple or branched, pubescent. Leaves rhomboid-lanceolate, 2–4 cm. long, entire, rather thick and firm, entire and revolute on the margin, green and glabrous above, densely clothed with a felt-like tomentum beneath; petiole 3–10 mm. long; heads 3–4 cm. broad; bracts ovate, 8–12 mm. long, tomentose; calyx 6–8 mm. long, villous; corolla white to pale lavender, 15–16 mm. long, pubescent without; stamens well-exserted.

Dry slopes, Upper Sonoran Zone; locally distributed in the Coast Ranges from Santa Barbara County to Orange County, southern California. Type locality: "S. E. California, San Bernardino Co." July–Sept.

6. *Monardella lanata* Abrams. Woolly Monardella. Fig. 4436.

Monardella lanata Abrams, Muhlenbergia 8: 39. 1912.

Stems tufted, woody at base, 2–4 dm. high, villous-tomentose. Leaves oblong-lanceolate, or appearing linear on account of the strongly revolute margins, 2–3 cm. long, with reduced ones in the short axillary branchlets, dull and short-pubescent or tomentose above, hoary beneath with a dense tomentum, thick and firm, short-petioled; heads about 2 cm. broad; bracts ovate-lanceolate, herbaceous, densely villous, equaling the calyx; calyx 8 mm. long, villous throughout, 10-nerved, teeth triangular-subulate, 1.5 mm. long; corolla white, the tube 10 mm. long, pubescent, lobes 4 mm. long; filaments sparsely pubescent.

Mountain slopes, near the border of the Upper Sonoran and Arid Transition Zones; mountains of eastern San Diego County, California. Type locality: Descanso grade, near the top, Cuyamaca Mountains, San Diego County. June–July.

7. *Monardella saxicola* I. M. Johnston. Rock Monardella. Fig. 4437.

Monardella saxicola I. M. Johnston, Bull. S. Calif. Acad. 18: 19. 1919.

Monardella hypoleuca var. *saxicola* Jepson, Man. Fl. Pl. Calif. 882. 1925.

Monardella viridis subsp. *saxicola* Ewan, Bull. Torrey Club 64: 521. 1937.

Monardella linoides var. *saxicola* Jepson, Fl. Calif. 3: 439. 1943.

Perennial with creeping branching rootstocks, stems suffrutescent, 2–3 dm. high, minutely puberulent. Leaves lanceolate to linear-lanceolate, 1.5–3 cm. long, pale green and microscopically puberulent above, cinereous-puberulent beneath, narrowed to a distinct petiole at base, margins slightly revolute; bracts lanceolate to lanceolate-ovate, short-pubescent on the veins and margin; calyx 7–8 mm. long, the teeth triangular-subulate; corolla rose-purple, tube distinctly exserted, lobes 4–5 mm. long.

Dry rocky ground, near the boundary of the Upper Sonoran and Arid Transition Zones; San Gabriel Mountains, southern California. Type locality: Brown's Flats, San Gabriel Mountains. June–Sept.

8. *Monardella viridis* Jepson. Green Monardella. Fig. 4438.

Monardella viridis Jepson, Fl. W. Mid. Calif. 465. 1901.

Monardella ledifolia Greene, Pittonia 5: 81. 1902.

Madronella viridis Arthur, Torreya 21: 12. 1921.

Perennial with a woody rootstock, stems suffrutescent, branched below, 15–30 cm. high, short-pubescent, the hairs spreading or somewhat reflexed. Leaves green and glabrate above or sparsely pubescent toward the base, gray and densely strigose beneath, ovate to narrowly lanceolate; bracts herbaceous, about 7 mm. long, ovate to ovate-lanceolate, villous on the margins; calyx about 7 mm. long, teeth triangular-subulate; corolla rose-purple, tube scarcely exserted.

Dry slopes and ridges, Upper Sonoran Zone; Lake and Napa Counties, California. Type locality: Upper Conn Valley, Napa County. July–Oct.

9. *Monardella purpurea* Howell. Siskiyou Monardella. Fig. 4439.

Monardella purpurea Howell, Fl. N.W. Amer. 550. 1901.

Perennial, herbage smooth and shining, usually purplish; stems slender, 8–15 cm. high, minutely and scantily puberulent above. Leaves oblong-ovate to oblong-lanceolate, 15–30 mm. long, obtuse, narrowed at base to a short slender petiole; bracts ovate to oblong-ovate, 10–15 mm. long, purplish, especially the veins, thinly puberulent, margins villous-ciliate; calyx 8–9 mm. long, purplish, the teeth subulate, about 1 mm. long, hirsute; corolla rose-purple, about 20 mm. long, the tube well-exserted, retrorsely hirsutulous, the lobes 6–8 mm. long, linear.

Rocky slopes, Canadian and Arid Transition Zones; Siskiyou Mountains, southwestern Oregon and adjacent California. Type locality: near Waldo, Josephine County, Oregon. June–Sept.

10. *Monardella odoratissima* Benth. Mountain Monardella. Fig. 4440.

Monardella odoratissima Benth. Lab. Gen. & Sp. 332. 1834.

Madronella odoratissima Piper, Contr. U.S. Nat. Herb. 11: 493. 1906.

Perennial with branching often decumbent stems woody at base, flowering branches several, erect or ascending, simple or with a few short sterile branchlets above, mostly 2–4 dm. long, sparsely short-pubescent above. Leaves narrowly to broadly lanceolate, mostly 2–3 cm. long, narrowed below to a subsessile base, green on both surfaces, but very sparsely and minutely puberulent; bracts broadly ovate to orbicular, about equaling the calyces, rounded or obtuse at



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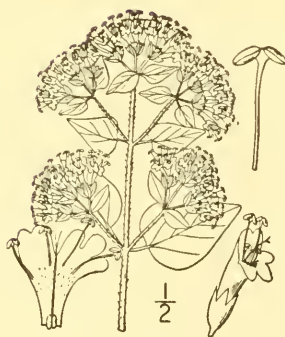
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4423. *Satureja Douglasii*
 4424. *Satureja Chandleri*
 4425. *Satureja mimuloides*

4426. *Pogogyne Douglasii*
 4427. *Pogogyne nudiuscula*
 4428. *Pogogyne serpylloides*

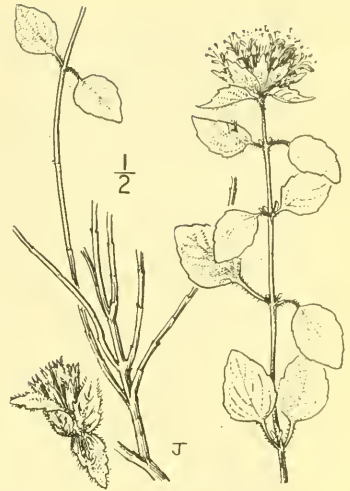
4429. *Pogogyne zizyphoroides*
 4430. *Origanum vulgare*
 4431. *Monardella macrantha*



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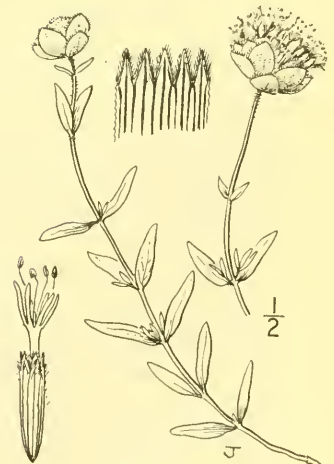
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4432. *Monardella nana*
 4433. *Monardella cinerea*
 4434. *Monardella villosa*

4435. *Monardella hypoleuca*
 4436. *Monardella lanata*
 4437. *Monardella saxicola*

4438. *Monardella viridis*
 4439. *Monardella purpurea*
 4440. *Monardella odoratissima*

apex, membranous and rose-purple at least at tip, pubescent on the veins and ciliate on the margins; calyx 6-8 mm. long, 13-nerved; corolla pale purple, about 15 mm. long, tube well-exserted, lobes very slender.

This species, which was first discovered by Douglas near the narrows above Kettle Falls on the Columbia River, Washington, is one of the most variable of all our native plants. The complex as a whole ranges from British Columbia to northern Lower California on the Pacific Coast, and eastward to Montana, Colorado and New Mexico; Arid Transition and Canadian Zones. Many specific segregates have been described, some of which are fairly well-defined geographic entities, and Epling (Ann. Mo. Bot. Gard. 12: 58-70. 1925) has proposed the following subspecies:

Monardella odoratissima subsp. *euodoratissima* Epling, Ann. Mo. Bot. Gard. 12: 59. 1925. Branches thinly pubescent above, hardly cinereous; leaves lanceolate, subsessile, green, appearing glabrous but sparingly puberulent; bracts ovate to suborbicular, pubescent on the veins; calyx woolly-pubescent around the teeth; corolla about 15 mm. long, usually pale purple and exserted. Northeastern Washington to northeastern Oregon, and locally in Nevada and New Mexico. Occasionally plants resembling this, the typical species, are found in southern Oregon and in northern California. Type locality: near the narrows above Kettle Falls on the Columbia River, Washington.

Monardella odoratissima subsp. *pinetorum* (Heller) Epling, op. cit. 68. (*Monardella pinetorum* Heller, Muhlenbergia 1: 36. 1904.) Branches minutely villous-pubescent, not glaucous; leaves ovate to lanceolate, 1.5-2.5 cm. long, abruptly narrowed to a usually margined petiole 2-8 mm. long, softly pubescent or short-villous; bracts ovate, erect, equaling the calyces, short-pubescent, purplish; calyx pubescent with straight spreading hairs; corolla rose-purple, the lobes distinctly tapering, the tube slightly exserted. Rocky situations, Arid Transition Zone; Coast Ranges in Lake and Glenn Counties, also southern Sierra Nevada in Fresno and Tulare Counties, California. Type locality: "southern slope of Mt. Sanhedrin, Lake county, above the sawmill, in dry gravelly ground among pine trees."

Monardella odoratissima subsp. *parvifolia* (Greene) Epling, op. cit. 69. (*Monardella parvifolia* Greene, Pl. Baker. 3: 22. 1901; *M. muriculata* Greene, Pittonia 5: 84. 1902.) Branches slender, mostly 1-2 dm. high, minutely puberulent and rather sparsely muriculate, sometimes reddish; leaves lanceolate or oblong, 1-2 cm. long, tapering at base to a margined petiole 1-3 cm. long, sparsely cinereous-puberulent; heads small, 1-2 cm. broad; bracts small, seldom exceeding the calyces, ovate, acute, short-pubescent on the back, purplish; calyx 5-6 mm. long, pubescent, sparingly villous around the teeth; corolla-tube little exceeding the calyx. Rocky alpine slopes and ledges, Boreal Zones; Sierra Nevada, mostly above 8,000 feet, California, ranging east to Colorado and New Mexico. Type locality: canyon of the Gunnison near Cimarron, Colorado.

Monardella odoratissima subsp. *australis* (Abrams) Epling, op. cit. 70. (*Monardella australis* Abrams, Muhlenbergia 8: 34. 1912.) Branches decumbent or ascending, sparsely villous-pubescent; leaves lanceolate to oblong, green or cinereous, 1-2.5 cm. long, narrowed to a short petiole 1-3 mm. long; bracts lanceolate, short-acuminate, exceeding the calyces, rose-purple, puberulent; corolla about 15 mm. long, rose-colored, the tube slightly exceeding the calyx, the lobes slender, slightly tapering. Mountain slopes and gravelly flats, Arid Transition Zone, southern California, from the San Gabriel to the San Jacinto Mountains. Type locality: Tamarack Valley, altitude 9,200 feet, San Jacinto Mountains.

Monardella odoratissima subsp. *discolor* (Greene) Epling, op. cit. 60. (*Monardella discolor* Greene, Pittonia 2: 24. 1889.) Branches pubescent above, scurfy and cinereous; leaves ovate-lanceolate, subsessile, hoary to cinereous with a dense minute tomentum; bracts woolly-pubescent or pubescent; calyx woolly-pubescent. Eastern base of the Cascade Mountains from Chelan County, Washington, to The Dalles and Mount Hood region, Oregon. Type locality: gravelly banks of the Yakima near Cle Elum, Washington.

Monardella odoratissima subsp. *glauca* (Greene) Epling, op. cit. 62. (*Monardella glauca* Greene, Pittonia 4: 321. 1901; *M. modocensis* Greene, loc. cit.; *M. rubella* Greene, Pittonia 5: 84. 1902.) Branches puberulent appearing glaucous and often purple; leaves ovate-lanceolate to oblong, 2-4 cm. long, narrowed at base to a distinct petiole 1-5 cm. long, often glaucous; outer bracts ovate, the inner usually oblong, puberulent on the back, purplish; calyx pubescent, hirsute around the teeth; corolla reddish purple, the tube usually well-exserted. Eastern slopes of the Cascade Mountains, southern Oregon, to the Mount Shasta region, California, and northwestern Nevada. Type locality: "Deserts of eastern Oregon."

Monardella odoratissima subsp. *pallida* (Heller) Epling, op. cit. 66. (*Monardella pallida* Heller, Muhlenbergia 1: 36. 1904; *Madronella pallida* Heller, op. cit. 1: 138. 1906; *Monardella odoratissima* var. *ovata* (Greene) Jepson, Man. Fl. Pl. Calif. 882, in part. 1925.) Branches scurfy-pubescent and cinereous, pale, never purplish; leaves lanceolate-oblong, 2-3 cm. long, rather abruptly narrowed to a usually margined petiole 2-8 mm. long, minutely cinereous-puberulent; bracts seldom exceeding the calyces, short, purplish, often recurved; calyx woolly, usually densely so throughout, the heads appearing very compact; corolla pale, usually whitish, the tube little or not at all exserted. This is the most common *Monardella* in the Sierra Nevada, California. Arid Transition and Canadian Zones. Type locality: foot of the ridge on south side of Donner Lake, Nevada County, California.

11. *Monardella Robisonii* Epling. Robison's *Monardella*. Fig. 4441.

Monardella Robisonii Epling in Munz, Man. S. Calif. 451, 600. 1935.

Perennial with branching woody caudex, leaf-bearing branches 4-5 dm. high, simple or branched, cinereous-hirtellous. Leaves ovate-lanceolate to narrowly ovate-elliptic, 6-15 mm. long, cinereous-hirtellous especially on the veins; petioles 1-3 mm. long; bracts membranaceous, pallid, ovate, 8-10 mm. long, hirtellous; calyx 7-8 mm. long, the teeth narrowly deltoid, 1-1.5 mm. long; corolla pale, the tube slightly exserted, the lobes about 2 mm. long.

Rocky desert slopes, Upper Sonoran Zone; Little San Bernardino Mountains, San Bernardino County, California. Type locality: "Keyes Ranch, Little San Bernardino Mts., among boulders and in crevices." June.

12. *Monardella linoides* A. Gray. Flax-leaved *Monardella*. Fig. 4442.

Monardella linoides A. Gray, Proc. Amer. Acad. 11: 101. 1876.

Monardella anemonoides Greene, Pittonia 5: 86. 1902.

Madronella linoides Greene, Leaflets Bot. Obs. 1: 169. 1906.

Stems several from a woody base, the branches erect, 25-45 cm. high, almost silvery with a dense puberulence of microscopically minute retrorsely appressed hairs. Leaves linear to linear-lanceolate, 1.5-2.5 cm. long, acute, narrowed at base to a short winged petiole or subsessile, microscopically puberulent and silvery on both sides; bracts ovate to oblong-ovate, 10-15 mm. long, membranous, white or rarely slightly tinged with light rose, prominently veined, puberulent and obscurely scurfy, soft-ciliate on the margins; calyx 8-9 mm. long, short-pubescent, the teeth hirsute-pubescent; corolla pale rose, 12-15 mm. long.

Dry slopes, Upper Sonoran Zone; southern Sierra Nevada, desert ranges of Mono and Inyo Counties, and

desert slopes of the San Jacinto and Cuyamaca Mountains, California. Type locality: vicinity of the Oriflamme Mine, Cuyamaca Mountains, San Diego County, California. June–Aug.

Monardella linoides subsp. *oblōnga* (Greene) Abrams. (*Monardella oblōnga* Greene, *Pittonia* 5: 83. 1902.) Leaves silvery, oblong-lanceolate, obtusish, 1–1.5 cm. long; bracts ovate, acute, about equaling the calyces. Mount Pinos and Mount Frazier, Ventura and Kern Counties, California. Type locality: "in the mountains south of Tehachapi, California."

Monardella linoides subsp. *viminea* (Greene) Abrams. (*Monardella viminea* Greene, op. cit. 85.) Plants less silvery than in the typical species; leaves narrowly linear-lanceolate, mostly 2–3 cm. long and 2–2.5 mm. wide, rarely broader, gradually narrowed from below the middle to the apex; bracts lanceolate, acute, greenish white with the tips often rose-tinged, the subtending uppermost pair of leaves often exceeding the bracts. Canyons and hillsides of western San Diego County, California, and adjacent Lower California. Type locality: "some unrecorded locality in the mountains of San Diego Co."

Monardella linoides subsp. *stricta* (Parish) Epling, Ann. Mo. Bot. Gard. 12: 74. 1925. (*Monardella linoides* var. *stricta* Parish, *Erythea* 7: 96. 1899; *M. epilobioides* Greene, *Pittonia* 5: 85. 1902; *M. epilobioides* var. *erecta* Abrams, *Muhlenbergia* 8: 36. 1912.) Stems less silvery; leaves mainly linear-lanceolate, acute, 10–15 mm. long; bracts lanceolate, acuminate, reddish purple. Dry slopes, Arid Transition Zone; San Gabriel and San Bernardino Mountains, California. Isolated colonies of similar plants also occur in the Panamint Mountains. Type locality: dry hills, Bear Valley, San Bernardino Mountains.

13. *Monardella crīspa* Elmer. Crisp *Monardella*. Fig. 4443.

Monardella crīspa Elmer, Bot. Gaz. 39: 46. 1905.

Monardella undulata var. *crīspa* Epling, Ann. Mo. Bot. Gard. 12: 77. 1925.

Perennial, the branches woody below, ascending or decumbent, 2–4 dm. high, more or less tomentose. Leaves oblanceolate-spatulate, those on the main branches 1.5–2 cm. long, usually with a number of reduced ones on short axillary branchlets, margins undulate or often crisped, rather thinly tomentose on both surfaces; heads about 2 cm. broad; bracts round-ovate, 7–8 mm. long, membranous and tinged with reddish purple between the 7–8 parallel veins; calyx 6 mm. long, villous, teeth triangular, rather blunt at the apex; corolla purple, tube not exerted.

Stabilized or drifting sand dunes, Upper Sonoran Zone; vicinity of the coast, San Luis Obispo and Santa Barbara Counties, California. Type locality: Surf, Santa Barbara County. April–June.

14. *Monardella undulāta* Benth. Curly-leaved *Monardella*. Fig. 4444.

Monardella undulata Benth. Lab. Gen. & Sp. 332. 1834.

Madronella undulata Greene, Leaflets Bot. Obs. 1: 168. 1906.

Annual, usually bushy-branched from near the base, 2–4 dm. high, or sometimes reduced to slender simple or few-branched stems, purplish and strigose. Leaves oblong-oblanceolate, narrowed to a short petiole, obtuse at apex, 2–5 cm. long, slightly fleshy, the margins undulate, glabrate or sparingly short-villous or pubescent; heads rather compact, 2–3 cm. broad; bracts round-ovate to oblong-ovate, membranous between the prominent greenish veins, usually purplish at least at apex, glabrate or usually villous on the veins; calyx 5–9 mm. long, membranous between the 13–15 nerves, more or less villous, the teeth triangular-lanceolate; corolla 15–20 mm. long, rose-purple, the tube well-exserted.

Sandy soils, near the coast, Upper Sonoran and Humid Transition Zones; Marin County to northern Santa Barbara County, California. Type locality: probably near Monterey. Collected by Douglas. May–Aug.

15. *Monardella lanceolāta* A. Gray. Mustang Mint or Mountain *Monardella*. Fig. 4445.

Monardella lanceolata A. Gray, Proc. Amer. Acad. 11: 102. 1876.

Monardella sanguinea Greene, *Pittonia* 5: 86. 1902.

Madronella lanceolata Greene, Leaflets Bot. Obs. 1: 169. 1906.

Madronella sanguinea Greene, loc. cit.

Monardella lanceolata var. *sanguinea* Jepson, Man. Fl. Pl. Calif. 883. 1925.

Annual, stems erect, simple or usually divaricately branched above, 2–4.5 dm. high, puberulent. Leaves 2–5 cm. long, lanceolate to linear-oblong, entire or rarely remotely serrulate, narrowed at base to a slender petiole, 5–15 mm. long, sparsely puberulent; heads 1.5–3 cm. broad; bracts ovate-lanceolate, surpassing the calyces, membranous but green, often purplish above, pinnately veined, the principal vein-branches nearly erect with net-like veinlets between, scabrous and glandular-dotted; calyx 6–8 mm. long, glabrous or scabrous, teeth ovate-triangular, hirsute within; corolla pale to deep rose, 12–15 mm. long, tube slightly exerted, puberulent, lobes cupulate at the tips.

Flats and slopes, usually in sandy or gravelly soils, Upper Sonoran and Arid Transition Zones; Sierra Nevada from Shasta County, California, and adjacent western Nevada, southward to the Tehachapi Mountains and in the Coast Ranges from San Luis Obispo County southward through cismontane southern California to northern Lower California. Type locality: "California, from Plumas to San Diego Co." No specimens were cited by Dr. Gray and no type has been designated by subsequent monographers.

Monardella lanceolata var. *glandulifera* I. M. Johnston, Bull. S. Calif. Acad. 18: 20. 1919. Stems, petioles and bracts beset with rather stout glandular hairs or processes; corolla red-purple, glandular-dotted exteriorly on the tube and throat. A local variation found on Brown's Flats, San Gabriel Mountains, southern California, the type locality.

Monardella lanceolata var. *microcéphala* A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 459. 1886. Like the typical species in pubescence, but more slender and heads much smaller, not over 15 mm. broad; bracts 4–6 mm. long. Laguna Mountains, San Diego County, California, south to the Sierra San Pedro Martir, Lower California. Type locality: Potrero, San Diego County.



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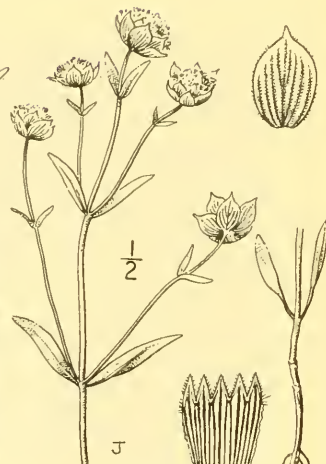
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4441. *Monardella Robisonii*
 4442. *Monardella linoides*
 4443. *Monardella crispa*

4444. *Monardella undulata*
 4445. *Monardella lanceolata*
 4446. *Monardella Breweri*

4447. *Monardella Pringlei*
 4448. *Monardella candicans*
 4449. *Monardella exilis*

16. *Monardella Brèweri* A. Gray. Brewer's *Monardella*. Fig. 4446.

Monardella Breweri A. Gray, Proc. Amer. Acad. 7: 386. 1867.

Madronella Breweri Greene, Leaflets Bot. Obs. 1: 168. 1906.

Monardella Elmeri Abrams, Muhlenbergia 8: 43. 1912.

Annual, the stems branched from near the base, erect, 15–30 cm. high, retrorsely puberulent, usually purplish. Leaves lanceolate, 2–3.5 cm. long, narrowed at base to a short petiole, acute or obtusish at apex, rather densely puberulent on both surfaces; bracts ovate, abruptly acuminate, 10–15 mm. long, purplish above, scarious and glabrous between the hispidulous veins; calyx 6–8 mm. long, hirsute on the veins, the teeth subulate, green or slightly tinged with purple; corolla 12–14 mm. long, rose-colored.

Sandy valleys and dry stream beds, Upper Sonoran Zone; California Coast Ranges, more especially the Inner Coast Ranges from eastern Alameda County to the Sierra Liebre, Los Angeles County, California. Type locality: Corral Hollow, Alameda County. May–Aug.

17. *Monardella Pringlei* A. Gray. Pringle's *Monardella*. Fig. 4447.

Monardella Pringlei A. Gray, Proc. Amer. Acad. 19: 96. 1883.

Madronella Pringlei Greene, Leaflets Bot. Obs. 1: 169. 1906.

Annual, stems branched, 2–3 dm. high, the branches and foliage puberulent or tomentulose but not densely so. Leaves lanceolate, 2–3 cm. long, narrowed below to a short petiole, acute at apex, entire; heads 12–17 mm. broad; bracts about 10 mm. long, ovate, abruptly acuminate at apex, thin and somewhat membranous between the 4–5 pairs of prominent lateral veins, tomentose, purplish above; calyx 6–7 mm. long, the teeth subulate, purplish, hirsute; corolla rose-colored, about 12 mm. long, the tube slightly exerted.

Sandy soils, Upper Sonoran Zone; a restricted endemic, known only from the sand hills west of Colton, San Bernardino County, California. May–July.

18. *Monardella cándicans* Benth. Sierra *Monardella*. Fig. 4448.

Monardella candicans Benth. Pl. Hartw. 330. 1849.

Madronella candicans Greene, Leaflets Bot. Obs. 1: 168. 1906.

Annual, 3–4 dm. high, corymbosely branched from the upper nodes, the branches seldom rebranching, purplish, retrorsely puberulent. Leaves lanceolate to oblong-lanceolate, puberulent on both sides or the upper side sometimes glabrate, narrowed at base to a slender petiole; heads 15–25 mm. broad; bracts broadly ovate, obtuse with a short acumination, hirsutulous on the greenish veins, white-scarious in the intervals; calyx 5–5.5 mm. long, the teeth narrowly triangular-lanceolate, erect, hirsute with white-scarious margins; corolla white, 8–10 mm. long, the tube barely exerted; stamens slightly exerted beyond the corolla-tube.

Sandy soils, Upper Sonoran and Arid Transition Zones; western foothills and middle elevations of the Sierra Nevada from Nevada County to Kern County, California. Type locality: probably Yuba River. Collected by Hartweg on his trip up the Yuba River. (See Jepson, Erythraea 5: 31–35 and 51–56. 1897, for an account of Hartweg's explorations in California.) May–July.

19. *Monardella éxilis* (A. Gray) Greene. Desert *Monardella*. Fig. 4449.

Monardella candicans var. *exilis* A. Gray, Syn. Fl. N. Amer. 2¹: 358. 1878.

Monardella exilis Greene, Pittonia 5: 86. 1902.

Annual, erect, branched from the base and from all but the uppermost nodes; branches rather slender, retrorsely puberulent. Leaves narrowly lanceolate, 1–2 cm. long or the lower a little longer and long-petioled, pale green and strigose on both surfaces; heads 10–15 mm. broad; bracts ovate to broadly ovate, abruptly acuminate, veins green, the interstices, tips and margins white-scarious, or sometimes faintly rose-colored; calyx 5–6 mm. long, scarious below, 15-nerved, thinly hirsutulous on the nerves, the teeth narrowly triangular-lanceolate, white-margined and hirsute-ciliate; corolla 9–10 mm. long, white, the tube barely exerted, retrorsely puberulent.

Sandy flats, Sonoran Zones; southern San Joaquin Valley and western Mojave Desert, California. Type locality: Mojave River. Collected by Palmer (No. 364).

20. *Monardella leucocéphala* A. Gray. Merced *Monardella*. Fig. 4450.

Monardella leucocephala A. Gray, Proc. Amer. Acad. 7: 385. 1867.

Madronella leucocephala Greene, Leaflets Bot. Obs. 1: 169. 1906.

Erect annual, 1.5–2 dm. high, dichotomously branched throughout, the branches pale, rather densely retrorsely short-pubescent. Leaves lanceolate to oblanceolate, 1–2 cm. long, strigose on both sides, narrowed to a short petiole; heads 10–15 mm. broad; bracts ovate to nearly orbicular, abruptly short-acuminate, scarious and pure white including the veins, these sparsely hispidulous; calyx 5–6 mm. long, hirsute, its teeth subulate, spreading or recurved; corolla white, about 5 mm. long, scarcely surpassing the calyx.

Sandy soils, Lower Sonoran Zone; San Joaquin Valley, along the Tuolumne and Merced Rivers in Stanislaus and Merced Counties. This local endemic is becoming almost extinct, for most of its habitats have become cultivated fields. Type locality: "Plains near Merced, in sandy soil." June–Aug.

21. *Monardella Douglásii* Benth. Fenestra *Monardella*. Fig. 4451.

Monardella Douglasii Benth. Lab. Gen. & Sp. 332. 1834.

Madronella Douglasii Greene, Leaflets Bot. Obs. 1: 168. 1906.

Annual, the stems erect, simple or divaricately branched, 1–3 dm. high, purplish, retrorsely

puberulent. Leaves lanceolate to linear-oblong, 1–3 cm. long, strigose, narrowed at base to a short petiole; heads 1–1.5 cm. broad; bracts ovate-lanceolate, acuminate, 1–1.5 cm. long, fenestra-like, the midvein prominent, lateral veins ascending and anastomosing to form a prominent marginal vein, the intervenous spaces membranous and translucent, the veins roughly puberulent and purple; calyx rather thinly hirsute, the teeth triangular-lanceolate, cuspidate; corolla deep reddish purple, tube little-exserted, lobes especially those of the upper lip ending in a cup-shaped gland.

Hillsides, Upper Sonoran Zone, sparingly distributed in the Inner Coast Ranges from Contra Costa County to San Benito and southeastern Monterey Counties, California. Type locality: "California." Collected by Douglas. June–July.

Monardella Douglasii var. *venosa* (Torr.) Jepson, Fl. Calif. 3: 443. 1943. (*Monardella candicans* var. *venosa* Torr. Pacif. R. Rep. 4: 123. 1857; *M. Douglasii* var. *Parryi* Jepson, Man. Fl. Pl. Calif. 884. 1925.) Stoutier than the typical species; heads 2–2.5 cm. broad; bracts broadly ovate, 15–18 mm. long, 8–10 mm. broad, hirsute-ciliate on the margins. East side of the Sacramento Valley in Butte and Sutter Counties, California. Type locality: "Plains of the Feather River, near Marysville." Apparently a rare species, seldom collected. In addition to the type which was collected by Bigelow in 1854, the only other collections known to me are: Cherokee, Butte County, Bidwell in 1879; Chico Valley, Parry in 1882.

24. *PYCNANTHEMUM* Michx. Fl. Bor. Amer. 2: 7. 1803.

Perennial aromatic herbs with mostly branching stems, glabrous or pubescent foliage and small white or purple-dotted flowers in terminal or sometimes also axillary capitate glomerules or cymose clusters. Calyx ovoid to cylindric, 10–13-nerved, equally or slightly unequally 5-toothed. Corolla bilabiate, the upper lip emarginate or entire, the lower 3-cleft, its lobes obtuse. Stamens 4, didynamous, nearly equal or the lower pair a little longer; anther-sacs parallel. Ovary deeply 4-parted; style slender. Nutlets smooth, pubescent or roughened. [Name Greek, meaning dense and flower, in reference to the glomerate inflorescence.]

A genus of about 17 species, natives of North America. Type species, *Clinopodium incanum* L. *Koellia* (Moench, Meth. 407. 1794.) is the older name, but *Pycnanthemum* has been conserved by the International Botanical Congress.

1. *Pycnanthemum californicum* Torr. Sierra Mint. Fig. 4452.

Pycnanthemum californicum Torr. ex Durand, Journ. Acad. Phila. II. 3: 99. 1855.

Pycnanthemum californicum var. *glabellum* A. Gray, Syn. Fl. N. Amer. 2: 355. 1878.

Koellia californica Kuntze, Rev. Gen. Pl. 2: 520. 1891.

Stems erect, simple or with a few terminal branches, 6–9 dm. high; herbage pale green and especially the upper parts more or less densely canescent-tomentose. Leaves ovate to ovate-lanceolate, obtuse or cordate at base, sessile or subsessile, entire or denticulate, 3–9 cm. long, punctate especially on the lower surface; heads terminal and solitary on the branches or forming an interrupted spike of 2–4 heads; calyx 4–5 mm. long, tube pubescent, teeth densely villous-tomentose at the tips; corolla white, resin-dotted, tube slightly exserted, lobes about 2 mm. long.

Mountain slopes and canyons, Upper Sonoran and Arid Transition Zones; Siskiyou County, California, south in the North Coast Ranges to Tehama County, and in the Sierra Nevada to Fresno County; also in the mountains of southern California, from Los Angeles to San Diego County. Type locality: near Nevada City June–Sept.

25. *LYCOPUS* [Tourn.] L. Sp. Pl. 21. 1753.

Perennial herbs with slender rootstocks, erect or diffuse stems, and sessile or petioled leaves. Flowers white or purple, verticillate in dense axillary clusters. Calyx campanulate, regular or nearly so, 4–5-toothed, not bearded in the throat, teeth obtuse or acute. Corolla funnellform, campanulate, upper lip entire or emarginate, the lower 3-lobed. Perfect stamens 2, anterior, the posterior pair rudimentary or wanting; anther-sacs parallel. Ovary deeply 4-parted; style slender, 2-cleft. Nutlets smooth, truncate at the summit, narrowed below. [Name Greek, meaning wolf-foot.]

A genus of about 15 species natives of the north temperate regions. Type species, *Lycopus europaeus* L.

Calyx-teeth ovate, almost obtuse, about equaling or shorter than the nutlets.

1. *L. uniflorus*.

Calyx-teeth lanceolate or lanceolate-subulate, acuminate, longer than the nutlets.

2. *L. americanus*.

Leaves unevenly and often saliently incised or pinnatifid.

3. *L. lucidus*.

Leaves evenly serrate, oblong or oblong-lanceolate.

1. *Lycopus uniflorus* Michx. Northern Bugle-weed. Fig. 4453.

Lycopus uniflorus Michx. Fl. Bor. Amer. 1: 14. 1803.

Lycopus communis Bicknell in Britt. Man. 803. 1901.

Plants green or often purplish, sparingly and minutely puberulent; stems slender, simple or branched, 1–6 dm. high; rootstock commonly tuberous at base; stolons arising from the axils of the bract-like leaves of lower nodes, very slender, not tuber-bearing. Leaves lanceolate or rhomboid-lanceolate, acute or acuminate, serrate, narrowed below to a sessile or subsessile base, 2.5–6 cm. long; calyx-teeth ovate-triangular to ovate-oblong, obtuse; corolla about 3 mm. long; rudimentary posterior stamens wanting or very minute; nutlets scarcely equaling the calyx.

Wet places, mainly Boreal and Humid Transition Zones; Alaska to northwestern California, east to Newfoundland and North Carolina. Type locality: Lake St. John, Quebec, and Lake Mistassini, southern Labrador. July–Sept.

2. *Lycopus americanus* Muhl. Cut-leaved Water-horhound. Fig. 4454.

Lycopus americanus Muhl. ex Bart. Fl. Phil. Prodr. 15. 1815.

Lycopus sinuatus Ell. Bot. S.C. & Ga. 1: 26. 1817.

Lycopus europaeus var. *sinuatus* A. Gray, Man. ed. 5. 346. 1867.

Lycopus lacerus Greene, Pittonia 3: 339. 1898.

Glabrous or sparingly pubescent perennial with rather stout stolons; stems erect, simple or branched, 3–9 dm. high. Leaves narrowly lanceolate to ovate-lanceolate, 3–10 cm. long, irregularly incised or lacinate-pinnatifid, acuminate at apex, tapering at base to a slender petiole; calyx-teeth triangular-lanceolate, cuspidate; rudimentary stamens slender, thickened at the tips; nutlets shorter than the calyx.

Wet places, Transition and Upper Sonoran Zones; British Columbia southward through the Pacific States to southern California and eastward across the continent. Type locality: Pennsylvania. July–Oct.

3. *Lycopus lucidus* Turcz. Pacific Water-horhound. Fig. 4455.

Lycopus lucidus Turcz. ex Benth. in A. DC. Prod. 12: 178. 1848.

Lycopus maritimus Greene, Pittonia 3: 340. 1898.

Pubescent on the stems and midveins of the leaves, rarely nearly glabrous; perennial with stolons; rootstock not tuberous or sometimes thickened at the end; stems usually stout, 3–8 dm. high, erect and strict, simple or rarely branched above. Leaves lanceolate or oblong-lanceolate, 4–8 cm. long, 1–2 cm. wide, acute or acuminate at apex, narrowed, sometimes rather abruptly so, to the subsessile base, sharply and evenly serrate; calyx-lobes lanceolate-subulate, acuminate, longer than the tube, hispidulous on the margins; corolla but little longer than the calyx; rudimentary stamens slender, somewhat thickened at the tips; nutlets much shorter than the calyx.

Wet places, Transition and Upper Sonora Zones; Okanogan County, Washington, southward on both sides of the Cascade Mountains to Lake County, Oregon, and to Shasta and Solano Counties, California; also in eastern Asia. Type locality: In Irkutia, Siberia. June–Oct.

Lycopus lucidus var. *americanus* A. Gray, Proc. Amer. Acad. 8: 286. 1870. (*Lycopus asper* Greene, Pittonia 3: 339. 1898.) Very similar to the typical species, but calyx-lobes triangular-subulate and barely equaling the tube; leaves mostly narrower and abruptly sessile. The variety ranges from Utah to Michigan and Kansas. Some forms in the Pacific States closely resemble it. Type locality: "Saskatchewan."

Thymus Serpyllum L. Sp. Pl. 590. 1753. Creeping Thyme. Stems procumbent or prostrate, woody below, 2–4 dm. long, puberulent; leaves 4–7 mm. long, broadly to narrowly ovate, glandular-punctate, short-petioled; flowers in crowded leafy-bracted whorls; calyx 3–4 mm. long, bilabiate; corolla light purple, about 5 mm. long. Sparingly established along roadsides in western Oregon. Naturalized from Europe.

26. MENTHA [Tourn.] L. Sp. Pl. 576. 1753.

Odorous perennial herbs with erect or diffuse stems, sessile or petioled usually punctate leaves, and small whorled flowers, the whorls axillary or in terminal congested or interrupted spikes. Calyx campanulate to cylindric, 10-nerved, regular or slightly bilabiate, 5-toothed. Corolla bilabiate, the tube shorter than the calyx, upper lip entire or emarginate, the lower 3-lobed. Stamens 4, equal, erect, included or exserted; filaments glabrous; anther-sacs parallel. Ovary 4-parted; style 2-cleft at the summit. Nutlets ovoid, smooth. [Name from the nymph Minthe, used by Theophrastus.]

A genus of about 30 species, natives of the north temperature regions. Type species, *Mentha spicata* L.

Flower-whorls forming terminal spikes, or some of the lower in the leaf-axils and somewhat distant.

Plants glabrous or nearly so.

Leaves sessile or nearly sessile; spike slender, more or less interrupted. 1. *M. spicata*.

Leaves all distinctly petioled; spikes thick and mostly dense.

Calyx-lobes ciliate; leaves lanceolate to oblong, acute.

2. *M. piperita*.

Calyx-lobes not ciliate; leaves broadly ovate to suborbicular, at least the lower obtuse.

3. *M. citrata*.

Plants tomentose or villous-tomentose.

Inflorescence hispidulous but not canescent; calyx hispidulous, its teeth not ciliate; leaves shallowly crenate-serrate.

4. *M. rotundifolia*.

Inflorescence canescent; calyx-teeth hispid-ciliate; leaves rather sharply and conspicuously serrate.

5. *M. alopecuroides*.

Flower-whorls all distant and in leaf-axils; leaves exceeding the whorls, or those of the upper whorls often reduced and shorter than the whorls in *M. Pulegium*.

Leaves rounded or obtuse at apex, those subtending the upper flower-whorls shorter than the whorls and turned downward.

6. *M. Pulegium*.

Leaves acute at the apex, those of the upper flower-whorls exceeding the whorls and not turned downward.

7. *M. arvensis*.

1. *Mentha spicata* L. Spearmint. Fig. 4456.

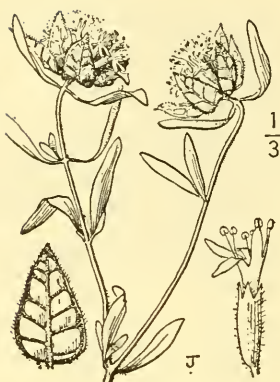
Mentha spicata L. Sp. Pl. 576. 1753.

Mentha viridis L. Sp. Pl. ed. 2. 804. 1763.

Perennial with stolons, glabrous or sparingly pubescent at the nodes; stems 3–12 dm. high, often purplish. Leaves oblong-lanceolate to ovate-lanceolate, sessile or short-petioled, sharply serrate, acute or acuminate at the apex, obtuse, somewhat rounded or subcordate at base, the larger 3–6 cm. long; flower-whorls in slender terminal leafless spikes often 6–8 cm. long in fruit; bracts subulate-lanceolate, equaling or surpassing the calyx, ciliate; calyx-teeth subulate, about



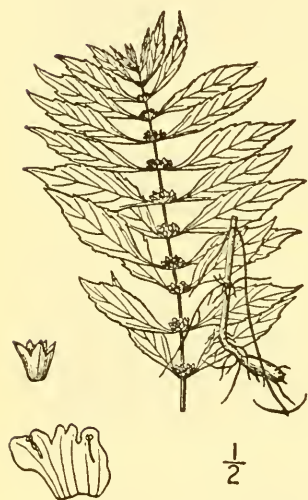
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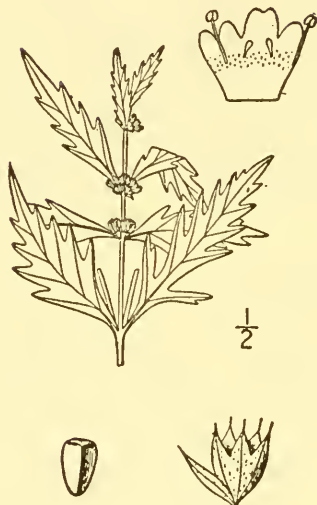
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4450. *Monardella leucocephala*
 4451. *Monardella Douglasii*
 4452. *Pycnanthemum californicum*

4453. *Lycopus uniflorus*
 4454. *Lycopus americanus*
 4455. *Lycopus lucidus*

4456. *Mentha spicata*
 4457. *Mentha piperita*
 4458. *Mentha citrata*

equaling the tube, ciliate on the margins, the inflorescence otherwise glabrous; corolla pale lavender.

Moist fields and meadows, Upper Sonoran and Transition Zones; Washington, on both sides of the Cascade Mountains, south to southern California, and eastward to the Atlantic Coast. Naturalized from Europe. July-Oct.

2. *Mentha piperita* L. Peppermint. Fig. 4457.

Mentha piperita L. Sp. Pl. 576. 1753.

Perennial by underground sometimes leafy-bracted stolons; stems erect or somewhat decumbent, branched, 3-8 dm. high, often purplish. Leaves lanceolate to ovate-lanceolate, dark green and firm, glabrous or sparsely pubescent on the veins beneath; whorls of flowers in terminal, dense or interrupted spikes, 2-12 cm. long in fruit; bracts narrowly lanceolate, acuminate, not surpassing the flowers; calyx-tube glabrous, the teeth about equaling or shorter than the tube, hirsute, sometimes sparingly so, ciliate; corolla glabrous, rose-purple to white.

Wet places, mainly in the Transition and Upper Sonoran Zones; Washington to southern California, and eastward across the continent. Naturalized from Europe. July-Oct.

3. *Mentha citrata* Ehrh. Bergamot Mint. Fig. 4458.

Mentha citrata Ehrh. Beitr. 7: 150. 1792.

Perennial by leafy-bracted stolons, glabrous throughout; stems decumbent or ascending, 3-6 dm. long, usually purple. Leaves slender-petioled, ovate to round-ovate, obtuse or the upper acute at apex, rounded or subcordate at base, thin, rather shallowly serrate, the larger about 5 cm. long; whorls of flowers in thick dense terminal spikes, and frequently also in the upper leaf-axils; spikes usually 2-2.5 cm. long at maturity; calyx-teeth subulate, glabrous, shorter than the tube; corolla rose-colored, about twice as long as the calyx.

Moist ground; sparingly established in the Pacific States, from western Washington to California. Naturalized from Europe. July-Nov.

4. *Mentha rotundifolia* (L.) Huds. Apple Mint. Fig. 4459.

Mentha spicata var. *rotundifolia* L. Sp. Pl. 576. 1753.

Mentha rotundifolia Huds. Fl. Angl. 221. 1762.

Perennial by leafy stolons, herbage more or less tomentose and viscid; stems mostly erect, 5-15 dm. high, simple or branched. Leaves elliptic to ovate-oblong, sessile or short-petioled, subcordate or rounded at base, obtuse at apex, the larger 2.5-5 cm. long, crenate-serrate, more or less rugose-reticulate beneath; flower-whorls forming rather slender spikes, approximate or the lower especially somewhat distant, becoming 5-10 cm. long in fruit; bracts lanceolate, acuminate, usually shorter than the flowers; calyx campanulate, barely 2 mm. long, the teeth subulate, about as long as the tube; corolla white, about 4 mm. long, puberulent.

Sparingly naturalized in the Pacific States from western Oregon to southern California. Native of Europe. Round-leaved mint. Horse mint. June-Oct.

5. *Mentha alopecuroides* Hull. Woolly Mint. Fig. 4460.

Mentha alopecuroides Hull, Brit. Fl. 126. 1799.

Stems stout, stoloniferous, 5-10 dm. high, leafy; herbage white-woolly. Leaves broadly oval to oblong-ovate, sessile or somewhat clasping by a subcordate or rounded base, obtuse at apex, sharply serrate, the larger 4-7 cm. long; flower-whorls in several stout dense terminal spikes 4-8 cm. long in fruit; calyx canescent, 2.5 mm. long, the narrowly subulate teeth about equaling to twice as long as the tube; corolla pink, 5 mm. long, pubescent.

Sparingly established as an escape from cultivation in western Washington and Oregon. Native of Europe. July-Oct.

6. *Mentha Pulegium* L. Pennyroyal. Fig. 4461.

Mentha Pulegium L. Sp. Pl. 577. 1753.

Stems in younger plants erect and simple below, arising from a short usually horizontal rootstock, in older plants more or less decumbent, 3-6 dm. high, branches arise from the nodes of the rootstock or the base of the stem, herbage canescent with a short-villous pubescence. Leaves 1-2 cm. long, elliptic to oblong-ovate, serrate or entire, tapering at base to a short petiole, or the uppermost reduced and subsessile, spreading or often recurved; flower-whorls often numerous, rather distant, the subtending leaves, especially of the upper whorls, reduced and bract-like, subsessile; pedicels scabrous; calyx hirsute on the nerves and teeth, the two lower teeth narrower and longer than the three upper ones, the throat conspicuously white-villous within; corolla lavender, about twice as long as the calyx, the lobes conspicuously villous on the outside.

Low moist ground, mainly Upper Sonoran Zone; rather sparingly naturalized in the Pacific States from western Oregon to southern California. Native of Europe. June-Oct.

7. *Mentha arvensis* L. Field Mint. Fig. 4462.

Mentha arvensis L. Sp. Pl. 577. 1753.

Stems stoloniferous, freely branching below or nearly simple, 1-8 dm. high, more or less retrorse-pubescent, especially on the angles. Leaves oblong to ovate, rounded at base to a distinct

petiole, serrate, usually rather closely so, minutely pubescent or short-villous, the larger 2.5–5 cm. long, the upper leaves not much smaller than the lower; flower-whorls all axillary; calyx pubescent, about 3 mm. long, teeth triangular-subulate, about equaling the tube; corolla pink to violet or white, about twice as long as the calyx, nearly or quite glabrous.

Moist rich soils, Boreal and Transition Zones; widespread in Eurasia and in eastern North America from Newfoundland to Kentucky and Nebraska. In the Pacific States the typical species is rarely collected and it is doubtful that it is native. Certainly most of the native plants belong to one or the other of the following varieties.

Mentha arvensis var. *canadensis* (L.) Kuntze, Rev. Gen. Pl. 2: 524. 1891. (*Mentha canadensis* L. Sp. Pl. 577. 1753.) Leaves lanceolate to oblong-lanceolate, cuneate-narrowed at base, pubescent; stems retrorsely pubescent. Widespread over North America from British Columbia to New Brunswick and southward. In the Pacific States it ranges from Washington to northern Lower California. Type locality: Canada.

Mentha arvensis var. *lanata* Piper, Bull. Torrey Club 29: 223. 1902. Similar to variety *canadensis*, but the stems and the under side of the leaves densely tomentose or woolly lanate, especially toward the top of the stem. This is the most frequent form in the lowlands, especially near the coast, and ranges from British Columbia to southern California. Type locality: Parrott, Lincoln County, Washington.

Mentha arvensis var. *glabrata* (Benth.) Fernald, Rhodora 10: 86. 1908. (*Mentha canadensis* var. *glabrata* Benth. Lab. Gen. & Sp. 181. 1833.) Stems commonly rather strict and simple or few-branched, glabrous throughout except for a minute retrorse pubescence on the angles of the stems; leaves oblong to ovate. Restricted mainly to the higher altitudes (Boreal Zones) of the mountains ranging from British Columbia to southern California. Type locality: not given.

27. *HÝPTIS* Jacq. Collect. 1:101. 1786.

Annual or perennial herbs or shrubs, with opposite commonly toothed leaves, and bilabiate flowers in usually dense axillary clusters. Calyx straight or oblique; tube ovoid, campanulate or cylindric; lobes 5, nearly equal, acute or awn-tipped. Corolla 2-lipped, upper lip erect or spreading, the lower saccate, drooping. Stamens 4, declined and resting on the lower lip, all anther-bearing; anthers confluent 2-celled. Nutlets smooth or slightly roughened. [Name Greek, meaning resupinate or turned back, in reference to the lower lip of the corolla.]

A New World genus of about 350 species, ranging from the deserts of southern California to Texas and southern Florida, southward to South America where it is most abundant. Type species, *Hyptis verticillata* Jacq.

1. *Hyptis Émoryi* Torr. Desert Lavender. Fig. 4463.

Hyptis Émoryi Torr. in Ives Rep. 20. 1860.

Mesosphaerum Émoryi Kuntze, Rev. Gen. Pl. 2: 526. 1891.

Erect aromatic shrubs, 1–3 m. high, with numerous slender usually straight branches, white scurfy-tomentose throughout. Leaves ovate, 15–25 mm. long on petioles half as long, truncate at base, crenulate; flowers in axillary short-peduncled cymes, somewhat paniculately arranged at the ends of the branches; pedicels 1–4 mm. long; calyx densely stellate-tomentose, 4–6 mm. long, the teeth setaceous; corolla violet, 4–6 mm. long; filaments of upper pair of stamens pubescent, the lower glabrous or nearly so.

Gravelly washes and benches, Lower Sonoran Zone; eastern Mojave Desert and western Colorado Desert, southern California, east to Arizona and south to Sonora and Lower California. Type locality: the lower Gila River, Arizona. Jan.–May.

Family 135. SOLANACEAE.*

POTATO FAMILY.

Herbs or shrubs with alternate leaves (the upper leaves opposite in *Petunia*). Flowers perfect, regular, solitary, umbellate, cymose or paniculate, axillary or terminal. Calyx 5-toothed or 5-cleft (rarely 4-toothed), rotate, campanulate, or tubular, usually persistent. Corolla tubular, campanulate, infundibuliform or rotate, 5-lobed, the lobes valvate or intricate and usually plicate in bud. Stamens 5, inserted on the tube, alternate with the lobes. Ovary superior, 2-celled, several- to many-ovuled; style one; stigma capitate, entire or slightly bilobed. Fruit a berry or capsule. Seeds several to many, ovoid or compressed. Embryo straight or strongly curved, subperipheral. Endosperm present.

A family of about 90 genera and over 3,000 species, generally distributed but predominantly in the western hemisphere.

Seeds moderately to strongly compressed, mostly 1 mm. or more in diameter; embryo strongly curved.

Shrubs with spiny branches; berry reddish and fleshy or greenish and dry and bony.

1. *Lycium*.

Herbs (except in some species of *Solanum*); fruit a yellow, greenish or black juicy berry or a capsule.

Corolla less than 4 cm. long or broad, usually much smaller; fruit 2-celled, not prickly.

Fruit a capsule; corolla tubular or infundibuliform.

Corolla 5–6 mm. long; capsule splitting apically; calyx-teeth not pungent. 2. *Oryctes*.

* Text contributed by Ira Loren Wiggins.

Corolla 2-3 cm. long; capsule circumscissile near apex; calyx-teeth pungent.

3. *Hyoscyamus*.

Fruit a berry; corolla rotate, broadly campanulate, or urceolate.

Anthers longitudinally dehiscent, not connivent, shorter than the filaments.

Fruiting calyx enlarged, investing the berry; corolla rotate or broadly campanulate; berry globose.

Corolla with tomentose pads alternating with the filaments; fruiting calyx herbaceous, closely investing the berry but open above.

4. *Chamaecaracha*.

Corolla lacking tomentose pads; fruiting calyx papery, nearly closed apically.

5. *Physalis*.

Fruiting calyx not enlarged nor investing the berry; corolla urceolate; berry obovoid or ellipsoid.

6. *Salpichroa*.

Anthers opening by terminal pores, connivent, usually longer than the filaments.

7. *Solanum*.

Corolla 5-20 cm. long, the limb 3-15 cm. broad; fruit falsely 4-celled, closely armed with heavy prickles.

8. *Datura*.

Seeds angulate or ovoid, not compressed, mostly less than 0.6 mm. in diameter; embryo straight or nearly so.

Flowers over 1 cm. long, racemose or paniculate, in ours white or yellow; plant erect or ascending.

9. *Nicotiana*.

Flowers 5-6 mm. long, solitary in the axils, purplish; plant prostrate or decumbent.

10. *Petunia*.

1. *LYCIUM* L. Sp. Pl. 191. 1753.

Erect or spreading shrubs with glabrous or pubescent herbage and mostly armed branches. Leaves often fasciculate, entire to minutely dentate, frequently mealy and glandular. Flowers single or in few-flowered, axillary glomerules on short, straight or reflexed pedicels. Calyx campanulate to tubular, commonly ruptured by the maturing fruit. Corolla white or oftener suffused with lavender, purple or green, tubular to funnelform, 4-7-lobed, glabrous or puberulent, especially on the margins of the lobes; stamens 4-6, the filaments subequal to distinctly unequal, glabrous, pubescent or glandular near the base, attached to base of the corolla-tube; fruit fleshy or dry. Seeds minutely pitted. [Named for the ancient country Lycia, in Asia Minor.]

A genus of about 90 to 100 species occurring chiefly in arid portions of all continents. Type species, *Lycium afrum* L.

Fruit 2-seeded; leaves fleshy-turgid, nearly terete in cross section; corolla-tube about equaling the calyx.

1. *L. californicum*.

Fruit several- to many-seeded; leaves flattened, subfleshy or nonfleshy, not terete in cross section; corolla-tube 2-5 times as long as the calyx.

Fruit fleshy, without lateral sutures; corolla-lobes not strongly revolute.

Stamens inserted immediately below the sinuses between the corolla-lobes, filaments glabrous.

2. *L. verrucosum*.

Stamens inserted below middle of corolla-tube, the filaments pubescent at base.

Corollas broadly funnelform, the limb as wide as the length of the tube; berries glaucous, often purplish.

3. *L. pallidum oligospermum*.

Corollas narrowly funnelform or clavate-rotate, the limb rarely as broad as the length of the tube; berries red or orange, not glaucous.

Calyx-lobes equaling or exceeding the calyx-tube; corolla-tube not over twice as long as the calyx, including the calyx-lobes.

Corolla-tube 3-4 mm. in diameter at the throat; calyx-tube somewhat angled, the lobes subequal or very unequal, triangular, lanceolate, or spatulate, acute.

4. *L. brevipes*.

Corolla-tube 1.5-2 mm. in diameter at the throat; calyx-tube not angled, the lobes equal, narrowly ovate to elliptic, rounded.

5. *L. Parishii*.

Calyx-lobes not over one-fourth as long as the calyx-tube; corolla-tube 3-8 times as long as the calyx.

Leaves and calyces puberulent; calyx-tube cylindrical, 4-7 mm. long.

6. *L. Fremontii*.

Leaves and calyces glabrous or glabrate; calyx-tube narrowly campanulate or cup-shaped, 2-4 mm. long.

Margins of corolla-lobes lanate-ciliate; leaves to 6 mm. wide; corolla-tube 1-1.5 mm. in diameter at mouth of calyx.

7. *L. Torreyi*.

Margins of corolla-lobes glabrous; leaves 1-2 mm. or rarely 3 mm. wide; corolla-tube less than 1 mm. in diameter at mouth of calyx.

8. *L. Andersonii*.

Fruit dry, with two lateral, transverse grooves above the middle; corolla-lobes strongly revolute.

9. *L. Cooperi*.

1. *Lycium californicum* Nutt. California Desert Thorn or Lycium. Fig. 4464.

Lycium californicum Nutt. ex A. Gray, Bot. Calif. 1: 542. 1876.

Lycium californicum var. *arizonicum* A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 437. 1886.

Intricately branched, dense shrub to 2 m. tall with knotty, bluntly spine-tipped branches. Leaves ovoid to linear-terete, fleshy, 1-3 mm. wide, 2-12 mm. long, sessile or subsessile, glabrous or minutely puberulent when young; flowers borne singly on pedicels 1-5 mm. long; calyx campanulate, about 2.5 mm. long, 2-4- or rarely 5-lobed, these triangular, minute; corolla white suffused with purple, tube 2-3 mm. long, the lobes rotate or slightly reflexed, equaling the tube; stamens 4, slightly exserted, the filaments adnate about to middle of corolla tube, pubescent at base; fruit ovoid 2-6 mm. long, firm, reddish, 2-seeded.

Dry bluffs and hillsides, mainly Lower Sonoran Zone; Los Angeles County southward along the coast to central Lower California, and from Cochise County, Arizona, interruptedly to Guaymas, Sonora. Type locality: San Diego, California. Feb.-July.



4459



4460



4461



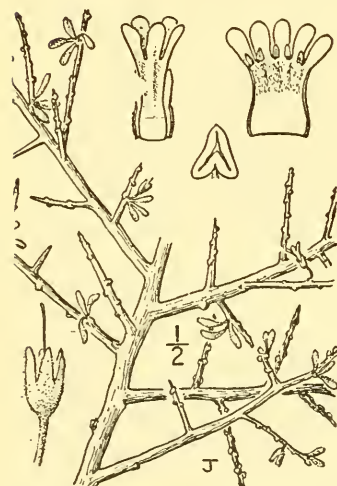
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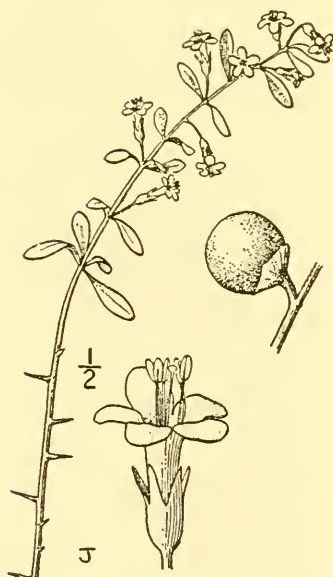
4463



4464



4465



4466



4467

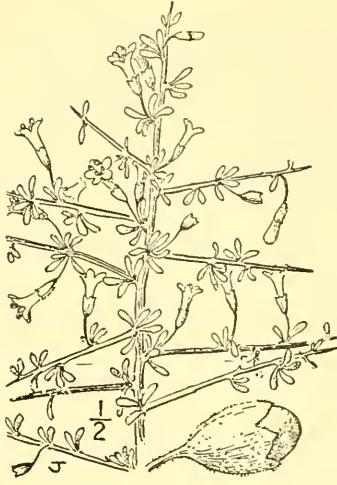
4459. *Mentha rotundifolia*
 4460. *Mentha alopecuroides*
 4461. *Mentha Pulegium*

4462. *Mentha arvensis*
 4463. *Hyptis Emoryi*
 4464. *Lycium californicum*

4465. *Lycium verrucosum*
 4466. *Lycium pallidum*
 4467. *Lycium brevipes*



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4476

4468. *Lycium Parishii*
4469. *Lycium Fremontii*
4470. *Lycium Torreyi*

4471. *Lycium Andersonii*
4472. *Lycium Cooperi*
4473. *Oryctes nevadensis*

4474. *Hyoscyamus niger*
4475. *Chamaesaracha nana*
4476. *Physalis ixocarpa*

2. *Lycium verrucosum* Eastw. San Nicolas Lycium. Fig. 4465.

Lycium verrucosum Eastw. Proc. Calif. Acad. III. 1: 111. 1898.

Compact, intricately branched shrub 1-3 m. tall, with heavy branches armed with scattered, blunt spines. Leaves spatulate, 3-6 mm. wide, 5-12 mm. long, subsessile, scurfy-pubescent; pedicels and campanulate calyx pubescent, the latter 3-4-lobed, the lobes narrowly lanceolate, 3-8.5 mm. long, slightly shorter than the tube; corolla 8-10 mm. long, 4-5-lobed, these about one-fourth as long as the tube, sparsely ciliolate; stamens 3-5, adnate to tube to bases of sinuses between corolla-lobes, filaments 1-1.5 mm. long, glabrous, but adjacent corolla-tube puberulent; fruit ovoid, reddish.

Known only from the type locality, on cliffs along an arroyo on San Nicolas Island, off the coast of Ventura County. April.

3. *Lycium pallidum* var. *oligospermum* C. L. Hitchcock. Rabbit Thorn.

Fig. 4466.

Lycium pallidum var. *oligospermum* C. L. Hitchcock, Ann. Mo. Bot. Gard. 19: 304. 1932.

Compact, much-branched, very thorny shrub, 0.5-1.2 m. tall with flexuous knotty branches and glabrous herbage. Leaves oblanceolate, 1-6 cm. long, slightly glaucous; flowers pendent on slender pedicels 8-12 mm. long; calyx broadly campanulate or cup-shaped, the tube 4-5 mm. long, the lobes triangular-oblong, 2-4 mm. long and erect in flower, spreading and often 5-8 mm. long in fruit; corollas narrow-campanulate, white to lavender, 12-18 mm. long, the spreading limb to 1.8 cm. broad; stamens exserted 3-5 mm.; fruit depressed-globose, 8-12 mm. in diameter, whitish to purplish, glaucous.

Arid, rocky hillsides and mesas, Lower Sonoran Zone; Inyo and San Bernardino Counties, California. Type locality: Barstow, California. March-May.

4. *Lycium brevipes* Benth. Desert Thorn. Fig. 4467.

Lycium brevipes Benth. Bot. Sulph. 40. 1844.

Lycium Richii A. Gray, Proc. Amer. Acad. 6: 46. 1861.

Lycium Palmeri A. Gray, Proc. Amer. Acad. 8: 292. 1870.

Lycium cedrosense Greene, Pittonia 1: 268. 1889.

Erect or ascending, irregularly branched spiny shrub 1-4 m. tall, herbage and young branches glandular-puberulent; bark tan or later gray. Leaves numerous, elliptic, obovate to broadly spatulate, 0.5-3.5 cm. long, 3-12 mm. wide, somewhat fleshy, sessile or subsessile, often glabrate in age; flowers few to numerous; calyx campanulate, the tube 2-6 mm. long, with 2-6 unequal, triangular to lance-triangular lobes, the longest of which equal or slightly exceed length of calyx-tube; corolla white to lavender, funnelform, the tube 6-10 mm. long, 2-4 mm. in diameter just above the calyx-tube, the limb 4-5-lobed, 6-10 mm. broad, lobes 3-5 mm. long, glabrous or sparsely ciliolate; stamens slightly exserted, about equaling the corolla-lobes; fruit ovoid, bright orange-red, 4-9 mm. in diameter.

Along arroyos and on hillsides and flats, chiefly Lower Sonoran Zone; San Diego and Riverside Counties, California, through the arid regions of Lower California and the western parts of Sonora. Type locality: Magdalena Bay, Lower California. March-April.

Lycium brevipes var. *Hássei* (Greene) C. L. Hitchcock. Leaflets West. Bot. 1: 58. 1933. (*Lycium Hasssei* Greene, Pittonia 1: 222. 1888.) Habit similar to that of the species. Distinguished by virtually equal, spatulate instead of triangular or lanceolate-triangular calyx-lobes which are sometimes 3 times as long as the calyx-tube. Cliffs and bluffs near the sea, on the Channel Islands, and occasionally as a cultivated ornamental from Santa Barbara to Los Angeles; San Diego; also near Niland, Imperial County, California. Type locality: Santa Catalina Island.

5. *Lycium Parishii* A. Gray. Parish's Desert Thorn. Fig. 4468.

Lycium Parishii A. Gray, Proc. Amer. Acad. 20: 305. 1885.

Lycium Pringlei A. Gray, loc. cit.

Erect, intricately branched shrub 1-3 m. tall with herbage and young twigs pubescent, slightly glandular, spines slender, 3-12 mm. long. Leaves short-elliptic to oblanceolate, 1.5-5 mm. wide, 5-18 mm. long, the longer, oblanceolate ones narrowing gradually to a petiole 1-5 mm. long; flowers usually solitary in the axils; calyx densely glandular-pubescent, the tube campanulate, 1.5-2.5 mm. long, the 5 lobes erect, narrowly ovate to elliptic, rounded at the apex, broadest at about the middle, 2-4 mm. long, equal; corolla purplish, the tube 6-10 mm. long, 1.5-2 mm. in diameter at the throat; corolla-lobes rounded, rotate or ascendingly spreading, 2.5-3 mm. long; stamens about equaling corolla-lobes; fruit ovoid, red, 4-6 mm. long.

Arid arroyos and desert flats, Lower Sonoran Zone; near San Bernardino, and in eastern San Diego County, California; southern Arizona into Sonora. Type locality: mesa near San Bernardino, California. March-April.

6. *Lycium Fremontii* A. Gray. Fremont's Desert Thorn. Fig. 4469.

Lycium Fremontii A. Gray, Proc. Amer. Acad. 6: 46. 1862.

Lycium gracilipes A. Gray, Proc. Amer. Acad. 12: 81. 1877.

Lycium Fremontii var. *gracilipes* A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 437. 1886.

A much-branched, erect, often rounded shrub, 1-3 m. tall, with pubescent, slightly glandular herbage, twigs and calyces, the spines slender, 1-2 cm. long. Leaves oblanceolate-spatulate,

2-7 mm. broad, 1-2.5 cm. long, finally glabrate; pedicels slender, 4-25 mm. long; calyx-tube cylindric, 4-7 mm. long, the lobes mostly triangular, 1-2 mm. long; corolla 10-15 mm. long, 2-4 mm. in diameter at the throat, the lobes spreading, 1.5-4 mm. long; stamens rarely equaling corolla-lobes; fruit ovoid, 5-10 mm. long.

Along arroyos and on desert flats and slopes, Lower Sonoran Zone; eastern San Diego County into southern Arizona, and southward to southern Lower California and central Sonora. Type locality: "Interior of California or country east of it." March-April.

7. *Lycium Tórreyi* A. Gray. Squawthorn or Torrey's Desert Thorn. Fig. 4470.

Lycium Torreyi A. Gray, Proc. Amer. Acad. 6: 47. 1862.

Lycium Torreyi var. *filiforme* M. E. Jones, Proc. Calif. Acad. II. 5: 714. 1895.

Spreading, intricately branched shrub 1-3.5 m. tall, with heavy spines 5-12 mm. long, and dense, puberulent to glabrate foliage and calyces. Leaves broadly spatulate, 3-10 mm. broad, 1-5 cm. long, gradually narrowing to a petiole 2-3 mm. long; calyx cup-shaped to short-cylindrical, 2.5-4.5 mm. long, the 5 lobes 0.5-2.5 mm. long, subequal, their margins ciliate; corolla 10-15 mm. long, the tube narrowly obconic, 3-4 mm. in diameter at the throat; corolla-lobes ovate to lanceolate, 3-4 mm. long, the margins lanate-ciliate; stamens about equaling the corolla-lobes; fruit bright red, ovoid, 8-12 mm. long.

Desert areas, Lower Sonoran Zone; Colorado and Mojave Deserts, California, to southern Nevada, southwestern Utah, Texas, and Chihuahua, Hidalgo, and Sonora. Type locality: Fort Yuma, California. March-May.

8. *Lycium Andersónii* A. Gray. Water Jacket or Anderson's Desert Thorn. Fig. 4471.

Lycium Andersonii A. Gray, Proc. Amer. Acad. 7: 388. 1868.

Lycium Andersonii var. *pubescens* S. Wats. Proc. Amer. Acad. 24: 65. 1889.

Straggly, much-branched, rounded shrub to 3 m. tall with glabrous, or rarely puberulent herbage. Leaves linear-terete to narrowly oblanceolate, succulent, 1-3 mm. broad, 3-15 mm. long, gradually attenuate toward the base; flowers slender, whitish suffused with lavender; calyx minute, cup-shaped, the tube 1-2 mm. long, glabrous, the teeth about one-fourth as long as the tube, triangular, sparsely ciliate marginally; corolla-tube 10-16 mm. long, 1-1.5 mm. in diameter at the base, 2-3 mm. broad at the throat, lobes 4-5, 1.5-2.5 mm. long, entire, fimbriate or ciliate; stamens exserted 2-3 mm.; fruit ovoid to ellipsoid, bright red, 4-8 mm. long.

Arid slopes, banks of arroyos, and desert flats, mainly Lower Sonoran Zone; coastal Los Angeles and San Diego counties, California, to New Mexico, central Utah, and southward into Sinaloa and Lower California. Type locality: southeastern Nevada. March-May.

Lycium Andersonii var. *deserticola* (C. L. Hitchcock) Jepson, Fl. Calif. 3: 461. 1943. (*Lycium Andersonii* f. *deserticola* C. L. Hitchcock, Ann. Mo. Bot. Gard. 19: 280. 1932.) Leaves plane or nearly so, 2-3.5 cm. long; otherwise as in the species. Colorado Desert, California and adjacent Arizona; and in Inyo, Kern, and San Bernardino Counties, California. Type locality: Palm Springs, Riverside County, California.

9. *Lycium Coöperi* A. Gray. Peach Thorn or Cooper's Desert Thorn. Fig. 4472.

Lycium Cooperi A. Gray, Proc. Amer. Acad. 7: 388. 1868.

Lycium Cooperi var. *pubiflora* A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 238. 1886.

Lycium Shockleyi A. Gray, Proc. Amer. Acad. 22: 311. 1887.

A compact, spiny, very leafy stout shrub, 0.6-3.5 m. tall with minutely glandular-puberulent young twigs, leaves and calyces. Leaves oblanceolate to spatulate, 4-10 mm. broad, 1-3 cm. long, glabrate in age; flowers numerous, pendent beneath the branches; calyx-tube bowl-shaped to shallowly cylindrical, 4-5 mm. long in flower, to 8 mm. deep and expanded in fruit, the lobes one-half as long as to equaling the tube, erect at first but later rotately spreading; corolla greenish white, broadly funnelform to nearly cylindrical, the tube 10-18 mm. long, glabrous to pubescent outside, persistent some time after anthesis, the lobes 2.5-4.5 mm. long, rotate or reflexed, strongly revolute; stamens about equaling the corolla-tube, subequal, hispid below; fruit ovoid, greenish yellow, becoming dry, 6-10 mm. long, with a horizontal-lateral constriction of each locule between the middle and the apex, 1-2 seeds in each upper portion, several in the lower one of each locule.

Desert mesas, arroyos, and slopes, Lower Sonoran Zone; Mojave and Colorado Deserts, and the San Joaquin Valley in Kern County, California, to southwestern Utah, and western Arizona. Type locality: eastern slopes of the Providence Mountains, San Bernardino County, California. March-April.

Lycium chinense Mill. Gard. Dict. ed. 8. no. 5. 1768. Scrambling, thorny shrub with straggling branches 1-2.5 m. long; leaves rhombic-ovate, 1-3.5 cm. long; calyx cup-shaped, the tube 2-3 mm. long, glabrous, strongly veined; corolla funnelform-campanulate, the tube 5-8 mm. long, the lobes purplish, broadly ovate, nearly equaling the tube; stamens about equaling the corolla-lobes; fruit bright red, ovoid, 6-10 mm. long. Adventive in the bottom lands along the Lower Sacramento River.

Lycium halimifolium Mill. Gard. Dict. ed. 8. no. 6. 1768. (*Lycium vulgare* [Ait.] Dunal in A. DC. Prod. 13¹: 509. 1852.) A sparingly spiny shrub with recumbent to scrambling branches 1-6 m. long; leaves ovate to spatulate, 2-6 cm. long, glabrous; calyx usually 5-lobed, about 2.5 mm. long; corolla rotate-campanulate, the tube 3-7 mm. long, the 4-5 lobes from one-third as long to nearly equaling the tube, strongly spreading to recurved; stamens exserted 3-5 mm.; fruit salmon-red, 8-10 mm. long. Adventive at scattered localities from the vicinity of Salem, Oregon, to Santa Clara and Amador Counties, California. Also in Nevada and Utah.

2. *ORÝCTES* S. Wats. Bot. King Expl. 274. 1871.

Low erect annual with sparsely scurfy foliage. Flowers pedicellate, in few-flowered, axillary umbels. Calyx-lobes 5, narrow. Corolla yellow or brownish, tinged with blue

or purple, short-tubular, teeth 5, short. Stamens 5, inserted near base of corolla-tube, equaling the corolla or slightly exserted, unequal; anthers oval. Style equaling the larger stamens; stigma capitate, faintly bilobed. Capsule globose, membranous, 2-valved. Seeds orbicular, flattened, favose-pitted laterally, bearing a radiately ribbed membranous marginal wing. [Name Greek, meaning digger, applied because plant occurs in area occupied by Digger Indians.]

A monotypic genus from southern Idaho to Owens Valley, California.

1. *Oryctes nevadensis* S. Wats. Nevada *Oryctes*. Fig. 4473.

Oryctes nevadensis S. Wats. Bot. King Expl. 274. pl. 28. figs. 5-10. 1871.

Stems few from the base, 5-20 cm. tall, the herbage coarsely puberulent and somewhat scurfy. Leaf-blades linear to ovate or obovate, 1-3 cm. long, the margins subentire to undulate, gradually narrowing to petioles 0.5-1 cm. long; umbels 2-6-flowered; calyx lobed nearly to base, the lance-triangular lobes 2-3 mm. long in flower, 5-7 mm. long in fruit; corolla 5-6 mm. long, the rounded teeth erect, 0.4-0.6 mm. long; capsules 6-7 mm. in diameter; seeds tawny, the body 2 mm. in diameter, with papery wings one-fourth as wide.

Sandy flats and low hills, Sonoran Zones; Inyo County, California, northeast to Nevada and southern Idaho. Type locality: near the Big Bend of the Truckee River, Nevada. May-June.

3. *HYOSCYAMUS* [Tourn.] L. Sp. Pl. 179. 1753.

Erect viscid-pubescent narcotic annual or biennial herbs with alternate ample leaves and showy flowers in terminal racemes or spikes and solitary in the lower axils. Calyx campanulate or urceolate, 5-toothed, enlarging and enclosing the fruit. Corolla funnel-form, with an oblique, 5-lobed, slightly irregular spreading limb. Stamens mostly slightly exserted; filaments filiform; anthers ovoid. Stigma capitate. Fruit a 2-celled capsule, circumscissile near the apex. [Name Greek, meaning hog-bean.]

A genus of about 15 species mainly from the Mediterranean region. Type species, *Hyoscyamus niger* L.

1. *Hyoscyamus niger* L. Black Henbane. Fig. 4474.

Hyoscyamus niger L. Sp. Pl. 179. 1753.

Annual, or oftener biennial, strong-scented viscid-villous coarse herb to 1 m. tall. Leaves sessile, 5-20 cm. long, oblong to lanceolate in outline, irregularly pinnately lobed or pinnatifid, the lobes acute; flowers sessile or short-pediceled; calyx campanulate, 8-12 mm. long in flower, to 2.5 cm. long in fruit, the deltoid lobes about half as long as the tube; corolla 2-3 cm. long, the limb nearly as broad, greenish yellow with purplish center and conspicuously reticulated veins; filaments villous, anthers purple; capsule ovoid, 8-15 mm. long; seeds about 1.5 mm. long, dark brown, pitted.

An introduced weed well established in Okanogan and Whitman Counties, Washington. Also in the Great Lakes region and northeastern United States and adjacent Canada. Type locality: Europe. June-Sept.

4. *CHAMAESARACHA* A. Gray. Bot. Calif. 1: 540. 1876.

Low perennial herbs with entire to pinnatifid leaves tapering to narrowly margined petioles. Flowers solitary or 2-5 in axillary fascicles. Calyx campanulate, 5-toothed or 5-lobed, slightly enlarged in fruit. Corolla rotate, white or cream, faintly suffused with purple, more or less tomentose in the throat. Stamens inserted near base of corolla, about equaling the plicate corolla-limb; anthers oblong. Stigmas obscurely 2-lobed. Berries on recurved pedicels, globose. Seeds flattened, reniform, finely rugose-favose. [Name derived from the Greek word meaning ground, and the genus *Saracha*, named in honor of Isidore Saracha, a Spanish botanist.]

A genus of about 8 to 10 species from the western United States to Colombia, South America. Type species, *Solanum Coronopus* Dunal.

Represented by a single species in our area.

1. *Chamaesaracha nana* A. Gray. Dwarf *Chamaesaracha*. Fig. 4475.

Saracha nana A. Gray, Proc. Amer. Acad. 10: 62. 1875.

Chamaesaracha nana A. Gray, Bot. Calif. 1: 540. 1876.

Erect simple or slightly branched perennial, 5-25 cm. tall, from a tough, slender rootstock, herbage scaberulous-pubescent. Leaves ovate, 1-2.5 cm. wide, 2-5 cm. long, abruptly tapering to a narrowly winged petiole about half as long, the base of the blade often asymmetrical; peduncle usually shorter than the petiole; calyx-tube 3-4 mm. deep, the lobes 2-3 mm. long, triangular; corolla white with 5 basal greenish spots, strongly pubescent in the throat, 1.5-2 cm. broad; fruit dull white or yellowish, spherical, 8-12 mm. in diameter, surrounded by the enlarged calyx, the teeth of the latter subulate or triangular; seeds orbicular, flattened, 1.5-2 mm. in diameter, yellowish, favose-reticulate.

In sandy soil, Arid Transition Zone; Deschutes County, Oregon to Siskiyou County, California, and thence to Sierra County on the western slopes of the Sierra Nevada and to western Nevada and Mono County on the eastern side of the Sierra Nevada. Type locality: Sierra Nevada, California. May-July.

5. *PHYSALIS* L. Sp. Pl. 183. 1753.

Annual or perennial herbs with entire to sinuate-dentate leaves. Flowers solitary or less commonly in 2-5-flowered axillary clusters. Calyx campanulate to tubular-campanulate, 5-toothed, enlarged and inflated in fruit, 5-10-angled, 10-ribbed, reticulate-veined, enclosing the berry. Corolla obscurely 5-lobed, openly campanulate to campanulate-rotate, plicate in bud, yellow, whitish, or purplish, the center often of a different or deeper shade. Stamens 5, inserted near the base of the corolla-tube; anthers oval or oblong, dehiscing longitudinally. Style slender; stigma faintly bilobed. Fruit a many-seeded berry. Seeds numerous, flattened, reniform, finely pitted. [Name Greek, meaning bladder, and referring to the inflated fruiting calyx.]

A genus of 90 to 100 species, most of which occur in North and South America, only two species in Europe, and six or eight in India and Australia. Type species, *Physalis Alkekengi* L.

Plants annual; anthers usually tinged with blue, green or purple, rarely clear yellow.

Pedicels shorter than the fruiting calyces; anthers mostly broadly ovate or elliptic and less than twice as broad as long at dehiscence.

Herbage subglabrous, or sometimes sparsely pubescent on buds and youngest leaves; corolla 10-15 mm. wide; fruiting calyces 1-1.5 cm. long. 1. *P. ixocarpa*.

Herbage distinctly pubescent, at least on stems, pedicels, and petioles, the leaf-blades sometimes subglabrous; corolla 4-10 mm. wide; fruiting calyces mostly 2-3 cm. long.

Stems slender, diffusely spreading, sharply angled; fruiting calyces membranaceous; leaves thin, subentire or weakly sinuate-dentate, obtuse at the apex. 2. *P. pubescens*.

Stems stout, erect or ascendingly branched, obtusely angled; fruiting calyces firmly chartaceous; leaves thick, strongly sinuate-dentate, acute.

Leaves subcordate or entire and scarcely oblique at the base; fruiting calyx deeply sunken at the base; pubescence fine and short. 3. *P. ncomexicana*.

Leaves cordate and strongly oblique at the base; fruiting calyx shallowly sunken at the base; pubescence villous. 4. *P. pruinosa*.

Pedicels exceeding the fruiting calyces; anthers linear or oblong-elliptic, two or four times as long as broad at dehiscence.

Plants subglabrous; anthers tinged with purple, green or blue.

Corolla 12-20 mm. in diameter, the limb rotate, whitish with a yellow center; anthers 3-4.5 mm. long; fruiting calyx-lobes narrowly deltoid, acuminate. 5. *P. Wrightii*.

Corolla 5-6 mm. in diameter, subcampanulate, yellow; anthers 1.5-2.5 mm. long; fruiting calyx-lobes broadly deltoid, acute. 6. *P. lanceifolia*.

Plants distinctly short-villous, somewhat viscid-glandular; anthers clear yellow. 7. *P. Greenei*.

Plants perennial; anthers clear yellow, rarely tinged with blue, green or purple.

Leaf-blades lanceolate, oblanceolate, or spatulate, at least the upper ones 2-4 times as long as broad, cuneate at the base; plant glabrous or nearly so.

Corolla yellow with a brownish center; pubescence, when present, of long, stiff hairs; fruiting calyx not sunken at the base. 8. *P. lanceolata*.

Corolla yellow with a purplish center; pubescence, when present, of short, curved hairs; fruiting calyx deeply sunken at the base. 9. *P. subglabrata*.

Leaf-blades broadly ovate to suborbicular, about as broad as long, the base rounded, truncate or subcordate; plant distinctly and often densely pubescent.

Pubescence of simple hairs; calyx-lobes broadly deltoid, shorter than the tube at anthesis.

Foliage green; calyx-lobes one-fourth to one-half as long as the tube. 10. *P. crassifolia*.

Foliage somewhat canescent; calyx-lobes two-thirds to four-fifths as long as the tube. 11. *P. hederaceaefolia*.

Pubescence of stellate or branched hairs; calyx-lobes narrowly deltoid, equaling or exceeding the tube at anthesis. 12. *P. Fendleri cordifolia*.

1. *Physalis ixocarpa* Brot. Tomatillo. Fig. 4476.

Physalis ixocarpa Brot. ex Hornem. Hort. Hafn. Suppl. 26. 1819.

Physalis aequata Jacq. f. ex Nees, Linnaea 6: 470. 1831.

Erect to spreading annual 3-10 dm. high; glabrous, or the young leaves and calyces sparsely puberulent. Stems slender, spreading and diffusely branched, sharply angled; petioles 1.5-3.5 cm. long; leaf-blades ovate to elliptic, shallowly sinuate-dentate, 1-3.5 cm. wide, 2-6 cm. long, the base cuneate and somewhat asymmetrical, the apex acute to short-acuminate; pedicels 3-4 mm. long in flower, about 5-10 mm. long in fruit, shorter than the fruiting calyx; calyx campanulate, sparsely puberulent or glabrous, 3-4.5 mm. long, the deltoid lobes shorter than the tube at anthesis; corolla 10-15 mm. in diameter, bright yellow with purple center; anthers tinged with green or purple; fruiting calyx ovoid, 1.5-2 cm. long, obscurely 10-angled, sparsely villous or glabrous; berry purple.

Cultivated for its fruit and often escaping; established at numerous places from Marin County southward and across the continent to the Atlantic States. Type locality: Mexico. June-Sept.

2. *Physalis pubescens* L. Low Hairy Ground-cherry. Fig. 4477.

Physalis pubescens L. Sp. Pl. 183. 1753.

Physalis ramosa Mill. Gard. Dict. ed. 8. no. 9. 1768.

Alkekengi procumbens Moench, Meth. 2: 473. 1794.

Physalis hirsuta Dunal ex A. DC. Prod. 13: 445. 1852. Not *P. hirsuta* Mart. & Gal. 1845.

A slender, diffusely branching annual, pubescent throughout with spreading hairs, somewhat glandular. Petioles 6-25 mm. long; leaves 1.5-6 cm. long, 1-4 cm. wide, broadly ovate, rounded

to truncate and often asymmetrical at the base, obtuse at the apex, shallowly sinuate-crenate or nearly entire; pedicels slender, densely pubescent, equaling or slightly exceeding the petioles; calyx tubular-campanulate, 4-5 mm. long at anthesis, the lobes about equaling the tube at anthesis; corolla rotate or campanulate, 6-10 mm. wide, light yellow with darker center, sometimes tinged with green externally; anthers 1-1.5 mm. long, purplish; fruiting calyx membranaceous, scarcely angled, ovoid-pyramidal, somewhat shrunken at the base, the lobes acuminate.

An escape in sandy soil along washes and in cultivated fields; southern California to Pennsylvania and Florida, southward into Mexico. Type locality: India. June-Sept.

3. *Physalis neomexicana* Rydb. New Mexican Ground-cherry. Fig. 4478.

Physalis neomexicana Rydb. Mem. Torrey Club 4: 325. 1896.

Stout, erect annual with an obtusely angled stem and minutely but densely short-puberulent, slightly glandular foliage. Leaves 3-5 cm. long, broadly ovate to suborbicular, obtuse, rounded or obtuse at the base, sinuately crenate; petioles about equaling the blades; pedicels short and stout, rarely over 2 cm. long in fruit; calyx tubular-campanulate, 3-6 mm. long, the lobes lance-deltoid, acute, equaling or slightly exceeding the tube at anthesis; corolla subrotate-campanulate, 5-6 mm. in diameter, yellow with a darker center; anthers 1.5 mm. long, purplish or greenish; fruiting calyx ovoid, 2.5-3.5 cm. long, moderately sunken at the base, strongly 10-angled, shining, reticulate-veined, the lobes lanceolate-deltoid, acuminate, nearly twice as long as broad.

Sandy areas, mainly Upper Sonoran and Arid Transition Zones; eastern Arizona, southern Colorado and New Mexico. Introduced near Elsinore, California. Type locality: New Mexico. June-Sept.

4. *Physalis pruinosa* L. Tall Hairy Ground-cherry. Fig. 4479.

Physalis pruinosa L. Sp. Pl. 184. 1753.

Physalis pubescens Dunal ex A. DC. Prod. 13¹: 446. 1852. Not *P. pubescens* L. 1753.

Stout, erect annual 1-5 dm. high with obtusely angled, villous stems and villous herbage. Leaves ovate, mostly asymmetrical and cordate at the base, 2-10 cm. long, entire or more often sinuate-dentate to sharply dentate, on petioles 1.5-7 cm. long; pedicels 0.4-4 cm. long, recurved in fruit; calyx villous-viscid, 4-7 mm. long, the lobes narrowly triangular-ovate, about equaling the tube at anthesis; corolla campanulate, 4-8 mm. in diameter and slightly longer, yellow with purplish center; anthers yellow tinged with green or purple, rarely clear yellow; fruiting calyx firm, reticulate-veined, villous-pubescent, 2.5-3.5 cm. long, the tips of the lobes acute; berry 1-2 cm. in diameter, yellow or greenish with a reddish tinge.

Introduced sparingly in cultivated fields in Washington, commoner in the central United States. Type locality: "America." July-Sept.

5. *Physalis Wrightii* A. Gray. Wright's Ground-cherry. Fig. 4480.

Physalis Wrightii A. Gray, Proc. Amer. Acad. 10: 63. 1874.

Chamaesaracha physaloides Greene, Bull. Torrey Club 9: 122. 1882.

Erect or ascending annual 1-10 dm. high, with strongly angled, much-branched stems and sparingly pubescent to subglabrous foliage. Leaves lanceolate, 6-35 mm. wide, 2.5-8 cm. long, deeply sinuate-toothed, cuneate at the base, acute, somewhat attenuate at the apex, the margins finely ciliate; petioles slender, 1.5-5 cm. long, pedicels slender, 5-20 mm. long, finely but closely puberulent; calyx campanulate, scarcely angular, 3-5 mm. long with narrowly deltoid lobes about equaling the tube at anthesis; corolla rotate, 12-20 mm. in diameter, whitish or light yellow with deeper yellow center; anthers greenish, linear, 3-4.5 mm. long, on slender filaments about as long; fruiting calyx globose-ovoid, 1.5-2.5 cm. long, obscurely 10-angled, the lobes acuminate.

Roadsides, fields and ditches, mostly Lower Sonoran Zone; Colorado Desert to western Texas and southward through Sonora into Sinaloa. Type locality: "Prairies along the San Pedro River, Southwestern Texas." April-June.

6. *Physalis lanceifolia* Nees. Lance-leaved Ground-cherry. Fig. 4481.

Physalis lanceifolia Nees, Linnaea 6: 473. 1831.

Erect, robust annual 5-8 dm. high with ascending, angled, glabrous branches and subglabrous foliage. Petioles 1-3 cm. long; leaves lanceolate, 6-20 mm. wide, 3.5-7 cm. long, attenuate at both ends, entire to shallowly sinuate-toothed, dark green, subglabrous or with a few stiff, short hairs on the veins; pedicels filiform, 1.5-3 cm. long at anthesis; calyx puberulent, tubular-campanulate, about 2 mm. in diameter, 3-4 mm. high, the lobes deltoid, half as long as the tube; corolla yellow, narrowly campanulate, 5-6 mm. long, about as wide at anthesis; anthers ovoid, 1.5-2 mm. long, greenish or purplish; fruiting calyx broadly ovoid, 2-2.5 cm. long, on pedicels equaling or exceeding the calyx, the lobes broadly deltoid, not acuminate.

In sandy areas along roads and about fields, Lower Sonoran Zone; Imperial Valley, along the lower Colorado River, and eastward to Texas, southward into Central Mexico. Type locality: Mexico. March-June.

7. *Physalis Greenei* Vasey & Rose. Greene's Ground-cherry. Fig. 4482.

Physalis pedunculata Greene, Pittonia 1: 268. 1889. Not *P. pedunculata* Mart. & Gal. 1845.

Physalis Greenei Vasey & Rose, Contr. U.S. Nat. Herb. 1: 18. 1890.

Erect, spreading annual 1-4 dm. tall with slender, angular somewhat flexuous, puberulent

branches and finely puberulent foliage. Petioles slender, 1–2.5 cm. long; leaves ovate, sinuate-dentate, acute at the apex, broadly cuneate to subcordate at the base, 1.5–3 cm. long, 1.5–2.5 cm. wide; pedicels 1–3.5 cm. long at anthesis, to 5 cm. long in fruit; calyx broadly tubular-campanulate, 5–6 mm. long, 3.5–4 mm. broad, hispidulous; corolla 12–15 mm. broad, rotate, greenish yellow; fruiting calyx ovoid, rounded to slightly sunken at the base, acute to acuminate at the apex, 1.5–2.5 cm. long, moderately hispidulous on the low angles.

Sandy soil, Sonoran Zones; mainly near the coast from San Diego County southward to central Lower California. Type locality: Cedros Island. March–July.

8. *Physalis lanceolata* Michx. Prairie Ground-cherry. Fig. 4483.

Physalis lanceolata Michx. Fl. Bor. Amer. 1: 149. 1803.

Physalis pennsylvanica var. *lanceolata* A. Gray, Man. ed. 5. 382. 1867.

Perennial from a slender creeping rootstock with diffusely spreading branches 2–6 cm. long and sparsely hirsute foliage. Petioles 2–20 mm. long; leaves ovate to lanceolate or oblanceolate, 2–8 cm. long, entire or slightly sinuate, cuneate at the base, acute to obtuse at the apex; pedicels 0.5–3.5 cm. long, recurved in fruit; calyx campanulate, 8–10 mm. long, the ovate-lanceolate lobes about equaling the tube; corolla dull yellow, with brownish center, 8–13 mm. long, broadly campanulate to funnellform; fruiting calyx 2–4 cm. long, with ovate, rounded teeth, not sunken at the base; berry yellow or greenish yellow, 10–13 mm. in diameter; seeds 2.2–2.5 mm. long.

An introduced weed along railway embankments, Transition Zone; eastern Washington to Wyoming and South Dakota, New Mexico, Kansas, and South Carolina. Type locality: "Carolina." July–Sept.

9. *Physalis subglabrata* Mack. & Bush. Smooth Ground-cherry. Fig. 4484.

Physalis subglabrata Mack. & Bush, Trans. St. Louis Acad. 12: 86. 1902.

Erect perennial to 1.5 m. tall from a heavy, deep-seated rootstock with glabrous to sparsely pubescent herbage. Leaves ovate to ovate-lanceolate, asymmetrical at the base, acute to short-acuminate at the apex, 1–2.5 cm. wide, 2.5–8 cm. long, entire or oftener repand-dentate, the petioles 1–3 cm. long; pedicels 1–2 cm. long in flower; calyx campanulate, glabrous or sparsely pubescent on the angles near the base, 2–2.5 cm. long in fruit; corolla broadly campanulate, yellow, 1–1.5 cm. long; berry globose, 1–1.5 cm. in diameter, yellow or tinged with red or purple and often bursting the calyx.

An introduced weed in cultivated land and along roadsides, Upper Sonoran Zone; Malheur County, Oregon, eastward to the Atlantic States, south to Colorado, Oklahoma and Kentucky. Type locality: "Sheffield, Jackson County, Missouri." June–Sept.

10. *Physalis crassifolia* Benth. Thick-leaved Ground-cherry. Fig. 4485.

Physalis crassifolia Benth. Bot. Sulph. 40. 1844.

Spreadingly branched compact perennial 3–6 dm. high, 3–15 dm. wide, with finely viscid-puberulent foliage and stems. Petioles slender, equaling or somewhat exceeding the blade; leaves broadly ovate, deltoid, or ovate-cordate, usually small, 1–2.5 cm. wide, 1.5–3.5 cm. long, entire or the margins shallowly sinuate, acute to rounded at the apex, green, somewhat viscid, finely puberulent; pedicels slender, 8–15 or rarely 30 mm. long at anthesis, scarcely longer in fruit; calyces campanulate, truncate at the base, 3–5 mm. long, the lobes short, broadly deltoid, 1–1.5 mm. long; corolla campanulate-subrotate, 10–15 mm. broad, dull yellow, the tube slightly exceeding the calyx, with 5 narrow pubescent bands from base of tube to tips of the lobes; anthers about 3 mm. long, yellow; fruiting calyx ovoid, 1.5–2.5 cm. long, obscurely angled, the mouth usually open; berry greenish.

Sandy and rocky places, Lower Sonoran Zone; Colorado Desert and eastern Mojave Desert, eastward to Utah and Texas, southward to central Sonora and the Cape Region, Lower California. Type locality: Magdalena Bay. March–June.

Physalis crassifolia var. *cardiophylla* (Torr.) A. Gray, Syn. Fl. N. Amer. 2¹: 235. 1878. (*P. cardiophylla* Torr. Bot. Mex. Bound. 153. 1859.) Leaves thin, cordate, 2.5–6 cm. long. Colorado and Mojave Deserts and eastward in the northern parts of the range of the species to southern Utah. Type locality: "Sonora and California, desert of the Colorado."

11. *Physalis hederacfolia* A. Gray. Ivy-leaved Ground-cherry. Fig. 4486.

Physalis hederacfolia A. Gray, Proc. Amer. Acad. 10: 65. 1874.

Physalis Palmeri A. Gray, Syn. Fl. N. Amer. 2¹: 235. 1878.

Physalis digitalifolia Britt. Mem. Torrey Club 5: 288. 1895.

Erect or rarely decumbent cinereous-puberulent perennial 3–5 cm. high. Petioles 5–35 mm. long; leaves ovate-deltoid to cordate-subreniform, 1–3 cm. wide, 1.5–5 cm. long, coarsely sinuate-dentate, acute to rounded at the apex, broadly cuneate to cordate at the base; pedicels 5–15 mm. long at anthesis, recurved and the flowers nodding; calyx tubular-campanulate, 6–8 mm. long, viscid-puberulent, the lobes lance-deltoid, two-thirds to four-fifths as long as the tube at anthesis; corolla campanulate-rotate, 12–15 mm. wide, yellow; fruiting calyces ovoid, obtusely 10-angled, strongly reticulate-veined, 2–3 cm. long, usually 2–3 times as long as the pedicels; berry yellow.

Sandy plains, arroyos and desert canyons, Arid Transition and Sonoran Zones; southeastern California to Texas and northern Mexico. Type locality: New Mexico. June–Sept.

12. *Physalis Fëndleri* var. *cordifolia* A. Gray. Fendler's Ground-cherry.

Fig. 4487.

Physalis Fendleri var. *cordifolia* A. Gray, Syn. Fl. N. Amer. 2¹: 395. 1878.

Compact perennial 2-4 dm. high from a deep-seated rootstock, with ascending, slightly striate branches and puberulent throughout with fine, forked and several-rayed, branching hairs. Petioles 6-25 mm. long, narrowly winged; leaves cordate-ovate, 2-5 cm. long, green to cinereous, sinuate; pedicels slender, 4-10 mm. long at anthesis, 10-20 mm. long in fruit; calyx campanulate, 5-7 mm. high, the lobes narrowly deltoid, about equaling or slightly exceeding the tube at anthesis; corolla campanulate-subrotate, 8-10 mm. in diameter, greenish yellow with brownish center; anthers 3 mm. long, yellow; fruiting calyx narrowly ovoid, 2-3 cm. long, obscurely angled; berry yellow.

Arid sandy regions, Sonoran Zones; Providence and New York Mountains, eastward to Utah, Colorado and New Mexico. Type locality: St. George, Utah. May-Aug.

6. *SALPICHRÒA* Miers, Lond. Journ. Bot. 4: 321. 1845.

Herbaceous or suffrutescent perennial with slender stems and long-petiolate, entire leaves. Flowers perfect, white or yellow, solitary in the axils. Calyx 5-toothed, the lobes exceeding the shallow tube. Corolla tubular or (in ours) urceolate, 5-lobed, with a pubescent band about the middle inside. Stamens 5, inserted about the middle of the corolla-tube; filaments slender; anthers oblong, converging around the style, dehiscent longitudinally. Disk fleshy. Ovary 2-celled, many-ovuled; style filiform; stigma bilobed or entire. Fruit an ovoid, oblong, or obovoid berry. Seeds orbicular, strongly compressed. Embryo subperipheral, strongly curved. Endosperm present but scanty. [Name Greek, meaning tube and color.]

A genus of about 20 species in the Andes and extratropical regions of South America. Type species, *Atropa glandulosa* Hook.

1. *Salpichroa rhomboidea* (Gill. & Hook.) Miers. Lily-of-the-valley Vine.

Fig. 4488.

Atropa rhomboidea Gill. & Hook. Bot. Misc. 1: 135. pl. 37. 1830.*Salpichroa rhomboidea* Miers, Lond. Journ. Bot. 4: 326. 1845.*Salpichroma rhomboidea* Miers, Lond. Journ. Bot. 7: 333. 1848.

A scrambling herb with several slender, flexuous branches 5 dm. or more long from a woody rootstock. Stems and herbage sparsely hirsutulous with coarse, white hairs; leaves broadly elliptic to ovate, 7-20 mm. wide, 1-3 cm. long, acute at the apex, obtuse and often oblique at the base, entire, on petioles one-half to two-thirds as long as the blade; pedicels 4-6 mm. long; sepals lance-linear, 2-3 mm. long, nearly distinct; corolla white, fleshy, 6-7 mm. long, urceolate, the lobes broadly ovate, spreading, 1-1.5 mm. long; anthers barely exserted; style slender, 5-7 mm. long; berry oblong or obovoid, 10-12 mm. long, yellowish or whitish; seeds about 2 mm. in diameter.

Escaped from cultivation and established as a weed at numerous localities from the upper Sacramento Valley to San Diego. Native to South America. Type locality: Buenos Aires, Argentina. June-Oct.

7. *SOLANUM* L. Sp. Pl. 184. 1753.

Herbs or shrubs with glabrous, pubescent, or tomentose stems and foliage, sometimes climbing and sometimes armed with stiff prickles or spines. Leaves simple, entire or lobed or parted. Flowers white, blue, purple, or yellow, in cymes, umbels, panicles, or racemes. Calyx campanulate or rotate, 5-toothed or 5-cleft, sometimes enlarging in fruit. Corolla rotate, 5-angled or 5-lobed, the tube very short, the limb plaited in bud. Stamens 5, inserted on the corolla-tube; filaments short; anthers oblong, acute to acuminate, connivent around the style, dehiscent by a terminal pore, a short introrse subterminal slit, or longitudinally. Ovary 2-celled; stigma small, capitate or obscurely bilobed. Fruit usually a globose berry, fleshy or leathery. Seeds numerous, more or less flattened, the embryo annular. [Name said to be from *solamen*, quieting, owing to the narcotic effects of some species.]

A genus of about 1200 species widely distributed on all continents but especially well-represented in tropical and subtropical America. Type species, *Solanum nigrum* L.

Stems unarmed; pubescence of simple or forked hairs, or plants glabrous.

Plants annual; corollas small, 5-8 mm. in diameter (except in *S. furcatum*, in this 12-18 mm. in diameter).

Berries black or deep purple at maturity; leaves glabrous or essentially so; stems mainly erect or ascending.

Corollas 5-8 mm. in diameter; anthers 1.2-2.4 mm. long; granules in fruit 1-6 or lacking, scattered.

Sepals closely appressed to the fruit; anthers 1.8-2.4 mm. long, 2.5-3 times as long as the filaments.
1. *S. nigrum*.

Sepals more or less reflexed in fruit; anthers 1-1.2 mm. long, nearly or quite equaled by the filaments.
2. *S. nodiflorum*.

Corollas 12-18 mm. in diameter; anthers 3-3.5 mm. long; granules mostly in a ring near the base of fruit, 8-15 or more.
3. *S. furcatum*.

- Berries greenish or yellow at maturity; leaves short-pubescent or villous-glandular; stems often prostrate or decumbent.
- Leaves entire or coarsely dentate; herbage villous-glandular; calyx enlarging and partially enclosing the fruit; berry yellowish. 4. *S. sarrachoides*.
- Leaves deeply lobed or pinnatifid; herbage short-pubescent; calyx not enlarging nor enclosing the fruit; berry greenish. 5. *S. triflorum*.
- Plants perennial; corollas mostly 1.5 cm. or more in diameter.
- Berries yellow or reddish; leaves often hastate or pinnatifid.
- Anthers connivent; corollas deeply lobed; berries bright red, 8–12 mm. in diameter; plants more or less climbing. 6. *S. Dulcamara*.
- Anthers spreading; corollas shallowly lobed; berries yellow or greenish yellow, 15–20 mm. in diameter; shrub to 3.5 m. tall. 7. *S. aviculare*.
- Berries black, purplish, whitish, or greenish (yellow in *S. Clokeyi*); leaves usually not pinnatifid nor strongly hastate (if weakly hastate then the fruit smaller than that in the 2 species above).
- Corollas white, deeply lobed. 8. *S. Douglasii*.
- Corollas purple, bluish, or lavender, shallowly lobed.
- Stems glabrous or essentially so; leaves glabrous or sparsely and minutely puberulent with short, simple hairs.
- Filaments glabrous; leaves acute or weakly hastate at the base; pedicels usually exceeding the peduncles.
- Leaf-blades 2–4 mm. wide, often hastate with linear lobes 2–5 mm. long, finely puberulent on both sides. 9. *S. tenuilobatum*.
- Leaf-blades ovate-elliptic, 5–25 mm. wide, acute or tapering at both ends, not hastate, glabrous. 10. *S. Parishii*.
- Filaments glandular-villous on the inner surface; leaves subtruncate to subcordate at the base; pedicels usually shorter than the peduncles. 11a. *S. Xantii Hoffmannii*.
- Stems distinctly pubescent, often densely so; leaves mostly puberulent to tomentulose, at least beneath.
- Pubescence on stems of unbranched simple hairs, some of them gland-tipped.
- Berry 6–8 mm. in diameter, greenish; hairs on stems usually less than 1 mm. long. 11. *S. Xantii*.
- Berry 10–25 mm. in diameter, purple or yellow; longer hairs on stems usually 2–3 mm. long. 12. *S. Wallacei*.
- Pubescence on stems containing at least some forked or branched hairs, glands rarely present. 13. *S. umbelliferum*.
- Stems armed with stiff spines; pubescence on leaves chiefly or wholly stellate.
- Plants annual; leaves pinnatifid or bipinnatifid; calyx very prickly, wholly or partially enclosing the berry.
- Leaves pinnatifid, the lobes acute; spines coarse, distinctly flattened; anthers equal. 14. *S. sisymbriifolium*.
- Leaves irregularly bipinnatifid, the lobes rounded; spines finer, subulate; lowermost anther longer than other four. 15. *S. rostrata*.
- Plants perennial; leaves entire, sinuate, or lobed but not pinnatifid; calyx sparingly spiny or unarmed, not enclosing the berry.
- Leaves entire to repand-dentate, linear to lanceolate; herbage silvery-canescens throughout. 16. *S. elaeagnifolium*.
- Leaves lobed or some of them obscurely pinnatifid; herbage not silvery-canescens, at least not on upper surface of older leaves.
- Fruit 3–4 cm. in diameter; leaves persistently stellate-tomentose beneath, with a whitish, irregular band of tomentum along margins above. 17. *S. marginatum*.
- Fruit 1.5–2.5 cm. in diameter; leaves stellate-pubescent but not tomentose, without marginal band above. 18. *S. carolinense*.

1. *Solanum nigrum* L. Black Nightshade. Fig. 4489.

Solanum nigrum L. Sp. Pl. 186. 1753.

Annual herb 3–8 dm. high, with ascending or erect stems and glabrous or subglabrous herbage. Leaves ovate, 1.5–4 cm. wide, 3–8 cm. long, entire or irregularly and coarsely angulate-dentate, tapering to and decurrent on the petiole, this to 5 cm. long; peduncles 1–2.5 cm. long, about 3–8-flowered; flowers racemously arranged; pedicels slender, 3–8 mm. long in flower, about 1 cm. long in fruit; calyx broadly and shallowly campanulate, 1.5–2 mm. long at anthesis, the lobes broadly deltoid, about 0.5 mm. long, to 2 mm. long in fruit; corolla white, with minute yellow spots near the base, 5–6 mm. in diameter, the lobes 1–2 mm. long; filaments sparsely hairy, 0.8–1 mm. long; anthers 1.8–2.4 mm. long; fruit globose, black, glossy, 6–9 mm. in diameter; seeds 20–40, pale yellow, about 1.6 mm. broad, 1.8–2 mm. long, minutely reticulate-pitted; granules few or none.

Sparingly adventive in sandy soil of waysides and waste places, Transition Zones; western and central Oregon. Most of the material distributed under this name by American collectors is *S. nodiflorum*. Type locality: Europe. Feb.–Oct.

2. *Solanum nodiflorum* Jacq. Small-flowered Nightshade. Fig. 4490.

Solanum nodiflorum Jacq. Ic. Pl. Rar. 2: 288. pl. 326. 1786–93.

Solanum nigrum of western authors, not L.

Annual with spreading-ascending branches to 6 dm. long, glabrous or sparsely scabrous on angles of the stems. Leaves ovate to elliptic, 0.5–3.5 cm. wide, to 12 cm. long, acute, entire or sparingly sinuately toothed, cuneate to truncate at the base; peduncles slender, usually longer than the pedicels, these 5–12 mm. long at anthesis; sepals spreading to reflexed in fruit, 1–2.5 mm. long; corollas white or faintly tinged with purple, 4–6 mm. across, the lobes broadly lance-ovate, about 2 mm. long, sparsely puberulent outside toward the tip; anthers 1.2–1.4 mm. long, on hairy filaments 0.8–1 mm. long; berry globose, 5–6 mm. in diameter, black or purple-



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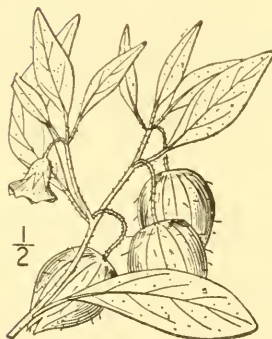
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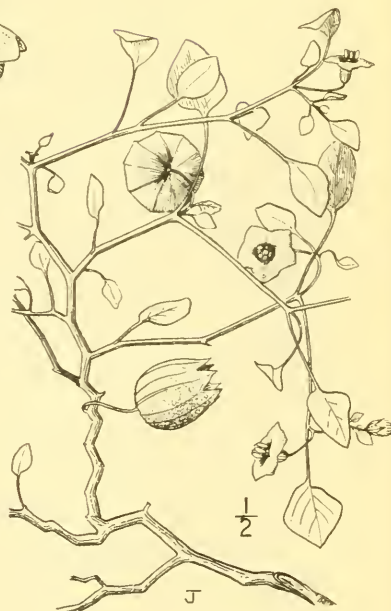
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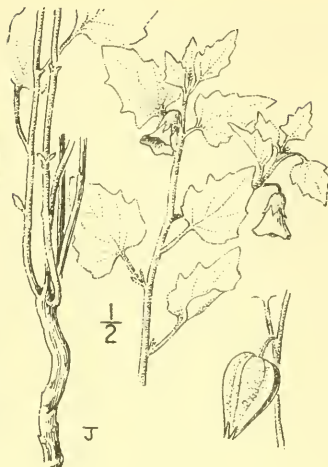
4477. *Physalis pubescens*
 4478. *Physalis neomexicana*
 4479. *Physalis pruinososa*

4480. *Physalis Wrightii*
 4481. *Physalis lanceifolia*
 4482. *Physalis Greenei*

4483. *Physalis lanceolata*
 4484. *Physalis subglabrata*
 4485. *Physalis crassifolia*



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4486. *Physalis hederacea*
4487. *Physalis Fendleri*
4488. *Salpichroa rhomboidea*

4489. *Solanum nigrum*
4490. *Solanum nodiflorum*
4491. *Solanum furcatum*

4492. *Solanum sarachoides*
4493. *Solanum triflorum*
4494. *Solanum Dulcamara*

black, glabrous; seeds about 40–60, pale cream, about 1.5 mm. in diameter, minutely granulose with low, rounded tubercles; granules in the fruit few, 3–6 or wanting.

In waste ground and margins of fields, usually in shaded or moist soil, mainly Upper Sonoran and Transition Zones; Oregon to southern California and widely distributed as a weed in the United States. Native of Europe. April–Dec.

3. *Solanum furcatum* Dunal. Forked Nightshade. Fig. 4491.

Solanum furcatum Dunal in Lam. Encycl. 11: 750. 1813.

Erect or ascending annual herb about 1 m. or less high with glabrous or very sparsely pubescent angulate stems, the angles very narrowly winged and bearing a few conical-based, simple, antrorse hairs. Leaves ovate to elliptic-ovate, 2–4.5 cm. wide, 4–8 cm. long, shallowly and broadly sinuate-toothed or subentire or sometimes angulate-dentate, acute to slightly acuminate at the apex, slightly decurrent on the petiole, glabrous or with a few scattered, simple hairs along the veins beneath; petioles 1–4 cm. long; peduncles slender, 1.5–4 cm. long, usually dichotomously forked near the apex, several-flowered, glabrous to sparsely pubescent with simple, mostly antrorse hairs; pedicels slender, 6–10 mm. long, glabrous to sparsely puberulent; calyx campanulate, 2.5–3 mm. deep, the narrowly deltoid lobes about equaling the tube; corollas 10–18 mm. in diameter, white or faintly tinged with lavender, puberulent without; anthers 3–3.4 mm. long, on filaments 1–1.5 mm. long; berries globose, black or dark purple, 5–6 mm. in diameter, containing 10–15 or more hard globose to reniform granules arranged in an uneven ring near the base of the fruit; seeds about 40, about 1.4 mm. wide, 1.8 mm. long, pale yellow, reticulate-pitted.

Stream-sides, fields, and in brushy areas, mainly Humid Transition Zone; adventive from western Oregon to San Mateo County, California. This species has been confused with *S. Douglasii*. Type locality: Peru. May–Oct.

4. *Solanum sarrachoides* Sendt. Hairy Nightshade. Fig. 4492.

Solanum sarrachoides Sendt. in Mart. Fl. Bras. 10: 18. pl. 1, figs. 9–12. 1846.

Solanum villosum of west American authors, not L.

Annual with decumbent or ascending stems 1–5 dm. long, with viscid, villous herbage. Leaves ovate, 1–3 or sometimes 4 cm. wide, 2.5–7 cm. long, gradually to abruptly narrowing at the base and somewhat decurrent on the petiole, sinuately toothed, acute to obtuse at the apex; peduncles usually longer than the pedicels, 5–10 rarely to 20 mm. long; pedicels 3–5 mm. long at anthesis; calyx 2–2.5 mm. long, villous at anthesis, enlarging, becoming somewhat papery and partially enclosing the berry at maturity; corolla white, 3–5 mm. in diameter, the narrowly triangular lobes villous outside near the tips; anthers 2–2.5 mm. long; berry globose, 6–7 mm. in diameter, yellow or yellowish brown; seed light buff or yellowish, 2–2.5 mm. long, minutely tessellated in concentric lines.

Cultivated fields and neglected areas, Upper Sonoran and Transition Zones; British Columbia and Idaho to southern California and Nevada. Native of Brazil. Type locality: Brazil. May–Oct.

5. *Solanum triflorum* Nutt. Cutleaf Nightshade. Fig. 4493.

Solanum triflorum Nutt. Gen. 1: 128. 1818.

Annual with prostrate to decumbent branches 1–4 dm. long, the herbage sparsely scaberrous-pubescent. Leaves elliptic to ovate in outline, pinnatifid, or deeply lobed, 1–2 cm. wide, to 4 cm. long, on petioles 1–1.5 cm. long, the lobes narrowly oblong-triangular, spreading, acute; peduncles stoutish, 5–15 mm. long, 1–6-flowered; pedicels 2–5 mm. long; calyx 2.5–3 mm. long, the lobes lance-ovate; corolla 6–8 (rarely to 10) mm. broad, white, sometimes tinged with green, the lobes ovate-attenuate, minutely puberulent outside and on the margins near the tip; anthers 3 mm. long; berry globose, 6–10 mm. in diameter, greenish at maturity; seeds numerous, pale, 2.5–2.8 mm. in diameter, microscopically tessellate.

Dry, sandy soil, Upper Sonoran and Arid Transition Zones; Washington and Oregon east of the Cascade Mountains, to Alberta, North Dakota, Kansas, New Mexico, Arizona, and in California from Modoc County to Mono County, east of the Sierra Nevada. Introduced near Claremont, Los Angeles County, California. Type locality: "Near Fort Mandan" (North Dakota?). May–Aug.

6. *Solanum Dulcamàra* L. Climbing Nightshade. Fig. 4494.

Solanum Dulcamàra L. Sp. Pl. 185. 1753.

Perennial straggling or climbing vine, woody below with branches to 3 m. long, sparsely puberulent with simple hairs or glabrate. Petioles slender, 1–4 cm. long; leaves ovate to hastate in outline, 2–7 cm. wide, 5–12 cm. long, acute or acuminate at apex, rarely entire, often with one lobe on one side near the base, or frequently deeply 3-lobed, the basal lobes broadly elliptic and much smaller than the terminal one; flowers in compound lateral cymes, drooping; pedicels about 1 cm. long; calyx 3–4 mm. deep; corolla deeply 5-cleft, 12–16 mm. wide, blue, the lobes triangular-lanceolate; anthers about 5 mm. long, connivent; berry oval to globose, bright red, 8–12 mm. long; seeds light, nearly orbicular, 1.8–2 mm. in diameter, minutely tessellated with low, rounded bosses.

Escaped from cultivation in waste places and moist, shaded spots; Washington and Idaho to northern California and Nevada and at scattered localities from Minnesota and Kansas to Nova Scotia. Type locality: Europe. May–Sept.

7. *Solanum aviculare* Forst. f. Poporo. Fig. 4495.

Solanum aviculare Forst. f. Prod. 18. 1786.

Solanum laciniatum Ait. Hort. Kew. 1: 247. 1789.

A leafy, unarmed shrub 1–3.5 m. tall with wholly glabrous stems and herbage, raised lines often decurrent on the stems below the margins of the petioles. Leaves petiolate, lanceolate or linear-lanceolate and entire to irregularly pinnatifid with 1–3 spreading lanceolate, acute lobes on each side, dark green and rather thin, to 20 cm. long, the lobes (or leaf if simple) 0.5–3 cm. broad, the veins often purplish or brownish; cymes 3–8-flowered, the peduncles 1–3 cm. long, the whole cyme 5–15 cm. long; pedicels slender, 1.5–2 cm. long at anthesis, nearly twice as long in fruit, thickened near the apex; calyx campanulate, 5–6 mm. long, the lobes ovate, apiculate, 1.5–2 mm. long at anthesis, 3–4 mm. long in fruit; corolla 3–3.5 cm. broad, shallowly and broadly lobed, purplish; anthers about 4 mm. long, on slender, glabrous filaments as long, spreading; berry subglobose to ovoid, about 1.5 cm. in diameter, to 2.5 cm. long, yellowish or greenish yellow; seeds numerous, 2–2.2 mm. long, reticulate with rounded ridges nearly as wide as the intervening spaces.

Introduced from New Zealand and sparingly established at various localities in the Coast Range from the San Francisco Bay region to Humboldt County, California. Type locality: New Zealand. June–Oct.

8. *Solanum Douglásii* Dunal. Douglas' Nightshade. Fig. 4496.

Solanum Douglásii Dunal in A. DC. Prod. 13¹: 48. 1852.

Solanum umbelliferum var. *trachycladum* Torr. Pacif. R. Rep. 7: 17. 1856.

Solanum nigrum var. *Douglasii* A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 228. 1886.

A herbaceous to shrubby perennial 0.6–2 m. tall, with angled or very narrowly winged stems and puberulent to subglabrate herbage, the angles of the stems roughened by the heavy, conical bases of simple, antrorse hairs. Leaves ovate, 1–6 cm. wide, 2–10 cm. long, coarsely sinuate-dentate, acute to short-acuminate, cuneate to subtruncate at the base, sparsely puberulent but green on both faces; petioles 1–2.5 cm. long, slightly winged above; peduncles 1–3 cm. long, several-flowered; pedicels slender, 5–12 mm. long; calyx 2–3 mm. long at anthesis, the lobes lance-oblong, 1.5–2 mm. long; corolla white with greenish basal spots, the lobes lance-oblong, 6–9 mm. long, acute; anthers about 3 mm. long, nearly 3 times as long as the villous filaments; berry black, 6–9 mm. in diameter; seeds pale yellow, about 1.5 mm. long, minutely reticulate-pitted.

On partly shaded slopes, canyons, and streamsides, chiefly Upper Sonoran Zone; Channel Islands and Coast Ranges of California from San Mateo County southward, east to Arizona and south in Mexico to Tamaulipas, Federal District, and southern Lower California. Type locality: California. Jan.–Dec.

9. *Solanum tenuilobatum* Parish. Narrow-leaved Nightshade. Fig. 4497.

Solanum tenuilobatum Parish, Proc. Calif. Acad. III. 2: 165. 1901.

Slenderly branched, suffrutescent plant 3–10 dm. tall, with barely ridged and slightly angled stems, these glabrous or sparsely and minutely pubescent on the angles of young branches with short, simple, antrorse, somewhat conical hairs. Leaves linear-lanceolate to oblong, 2–4 mm. wide, 1.5–3 cm. long, at least some with a pair of linear, spreading basal lobes 2–5 mm. long, puberulent on both surfaces with small hairs similar to those on the stems; umbels few-flowered, the peduncles usually shorter than the 1–1.5 cm. long slender pedicels; calyx broadly campanulate, 3–5 mm. wide, the lobes broadly deltoid, 1–1.5 mm. long, often purplish, glabrous; corolla blue with 2 greenish spots at the base of each lobe, 1.2–1.5 cm. broad, the lobes broadly deltoid; anthers yellow, 4–5 mm. long; fruit 6–7 mm. in diameter, glabrous.

In open or shaded places in chaparral and along margins of fields, Upper Sonoran Zone; southern and eastern San Diego County southward into northern Lower California. Type locality: "Lower California (probably near Ensenada)." March–April.

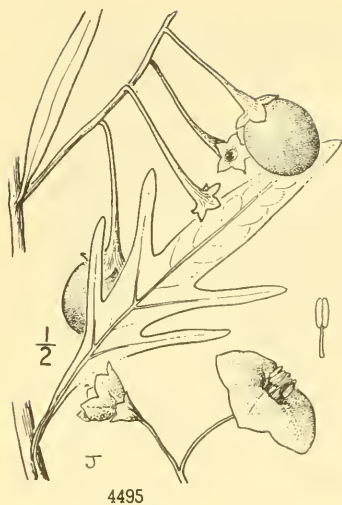
10. *Solanum Parishii* Heller. Parish's Nightshade. Fig. 4498.

Solanum Xantii var. *glabrescens* Parish, Proc. Calif. Acad. III. 2: 169, in part. 1901.

Solanum Parishii Heller, Muhlenbergia 2: 133. 1906.

Erect or ascending suffrutescent plant to 1 m. tall, with slender, slightly angled, striate stems and glabrous or subglabrous herbage, a few small, antrorse hairs sometimes on the margins and along the veins of the leaves and on young twigs. Leaves lance-ovate to elliptic, 6–25 mm. broad, 2–6.5 cm. long, usually acute at each end, entire or infrequently hastately lobed at the base; petioles about 1 cm. long; peduncles 2–10 mm. long, few-flowered; pedicels slender, equaling to three times as long as the peduncles; calyx 4–5 mm. high, the deltoid to oblong lobes about equaling the tube; corolla lavender, 15–18 mm. in diameter, minutely puberulent near the tips of the broad, short lobes without; anthers yellow, about 4 mm. long; filaments glabrous; berries globose, 7–9 mm. in diameter; seeds ellipsoid, strongly flattened, about 1.5 mm. wide, 2 mm. long, reticulate-granular, especially near the margins, pale brown or yellowish, gelatinous when wetted.

On grassy slopes and in brush, Upper Sonoran and Arid Transition Zones; Jackson County, Oregon, to Lake, Yolo, and Lassen Counties, California. Type locality: 3 miles northeast of Redding, California. April–Aug.



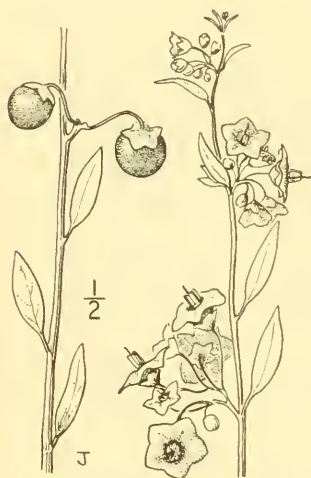
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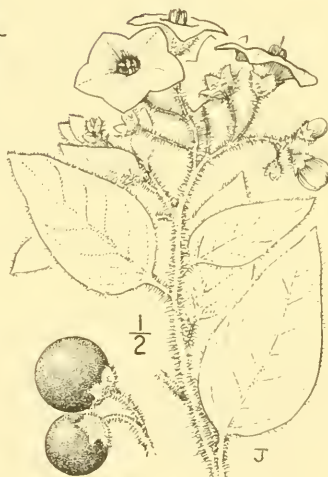
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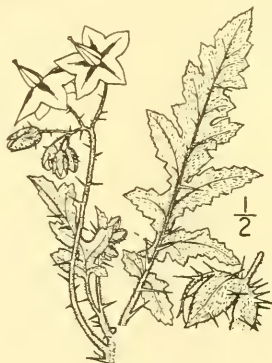
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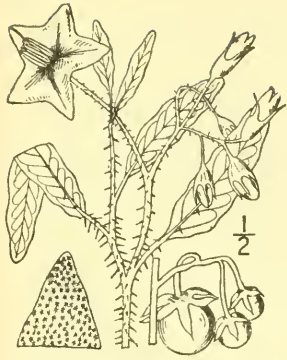


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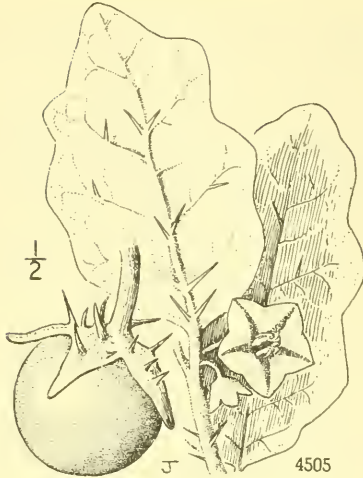
4495. *Solanum aviculare*
 4496. *Solanum Douglasii*
 4497. *Solanum tenuilobatum*

4498. *Solanum Parishii*
 4499. *Solanum Xantii*
 4500. *Solanum Wallacei*

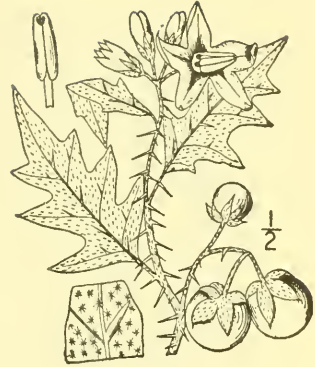
4501. *Solanum umbelliferum*
 4502. *Solanum sisymbriifolium*
 4503. *Solanum rostratum*



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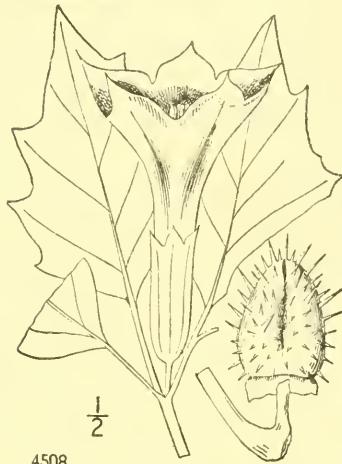
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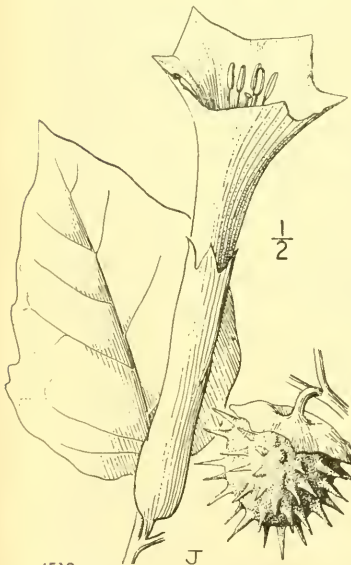
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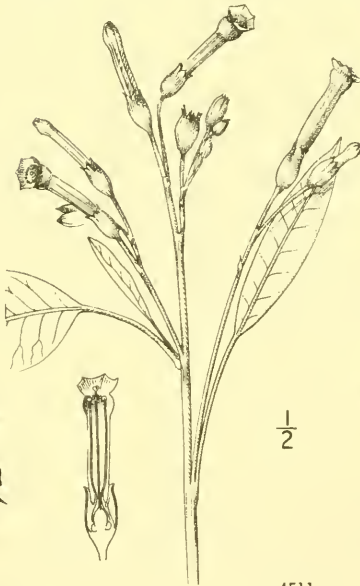
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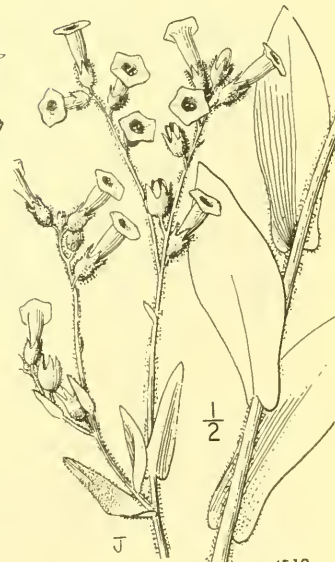
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4504. *Solanum elaeagnifolium*
4505. *Solanum marginatum*
4506. *Solanum carolinense*

4507. *Datura meteloides*
4508. *Datura Stramonium*
4509. *Datura ferox*

4510. *Datura discolor*
4511. *Nicotiana glauca*
4512. *Nicotiana trigonophylla*

11. *Solanum Xántii* A. Gray. Purple Nightshade. Fig. 4499.

Solanum Xántii A. Gray, Proc. Amer. Acad. 11: 90. 1876.

Solanum cupuliferum Greene, Erythra 3: 72. 1895.

Suffrutescent plant 2-10 dm. tall, short-villous with an admixture of simple, unbranched hairs and gland-tipped, slightly shorter hairs throughout, or glabrous in one variety. Leaves ovate, lance-ovate or oblong-ovate, subentire or sometimes hastately lobed at the base, 2-4 (or sometimes to 10) cm. long, slightly decurrent on the petioles, these to 1.5 cm. long; peduncles 5-12 mm. long, densely glandular-puberulent and villous, 4-9-flowered; calyx 5-6 mm. long, the lobes broadly deltoid, about one-third as long as to equaling the broadly campanulate tube; corolla purple to dark lavender, 1.5-2.5 cm. in diameter, finely puberulent without; anthers 3.2-4.4 mm. long, the filaments glabrous except in var. *Hoffmannii*; berries globose, 6-8 mm. in diameter, greenish, the somewhat enlarged calyx one-third to one-half as long as the berry; seeds broadly ovate-lenticular, 1.6-1.8 mm. long, 1.4-1.6 mm. wide, pale brownish, minutely reticulate.

Foothills and mountains, usually at edges of openings in the chaparral or forest, Upper Sonoran Zone to Transition Zone; Mendocino and Amador Counties, southward through the Coast Ranges and Sierra Nevada to northern Lower California, on the Channel Islands, and eastward into Arizona. Type locality: Fort Tejon. Feb.-July.

Solanum Xántii var. *intermedium* Parish, Proc. Calif. Acad. III. 2: 168. 1901. (*Solanum Wallacei* var. *viridis* Parish, op. cit. 166.) Leaves often subcordate to cordate at the base; pedicels and calyces glabrous or essentially so; stems and leaves short-villous and glandular-puberulent. Foothills and lower mountains of the Coast Ranges, Mendocino and Sonoma Counties, southward to Riverside County, California. Type locality: San Bernardino, California. Feb.-July.

Solanum Xántii var. *Hoffmannii* Munz, Bull. S. Calif. Acad. 31: 70. 1932. Stems and foliage glabrous or with a few scattered simple and glandular hairs on very young growth; leaves thin, mostly obtuse to truncate at the base, 3-6 cm. long; filaments densely glandular-puberulent on the inner surfaces. Foothills in the vicinity of Gaviota Pass, Santa Barbara County. Type locality: Gaviota Pass. March-June.

Solanum Xántii var. *montanum* Munz, loc. cit. Strictly herbaceous from a perennial root; stems 1-4 dm. long, often prostrate, densely short-villous with grayish hairs. Transition and Canadian Zones; San Gabriel and San Bernardino Mountains, between 6,000 and 9,200 feet. Type locality: Bear Valley, San Bernardino County. May-Aug.

Solanum Xántii var. *obispoense* (Eastw.) Wiggins. (*Solanum obispoense* Eastw. Leaflets West. Bot. 1: 104. 1934.) Plants 1-3 dm. tall; herbage densely glandular-viscid and villous-pubescent; leaves mostly erose-crenate, 1-2.5 (sometimes to 4) cm. long, often somewhat lobed near the base; berries 7-8 mm. in diameter. Foothills, Templeton, San Luis Obispo County, to Mount Pinos region, Ventura County. Type locality: Eldorado School, Santa Margarita, San Luis Obispo County. April-June.

Solanum Xántii var. *glabrescens* Parish, Proc. Calif. Acad. III. 2: 169. 1901. Subglabrous, the scattered, simple hairs are shorter than those of the species; glandular hairs almost or entirely lacking; leaves mostly attenuate at each end, 1-3 cm. long or less, often 6 mm. broad or less; flowers and fruit as in the species. Similar to *S. Parishii* in general appearance, but the pubescence more pronounced and the fruits slightly larger. Foothills and lower mountains, Monterey County to northern Lower California. Type locality: San Bernardino, California. Feb.-Aug.

12. *Solanum Wallacei* (A. Gray) Parish. Catalina Nightshade. Fig. 4500.

Solanum Xántii var. *Wallacei* A. Gray, Proc. Amer. Acad. 11: 91. 1876.

Solanum Wallacei Parish, Proc. Calif. Acad. III. 2: 166. 1901.

A coarse suffrutescent plant 1.5-2 m. tall, densely tawny-villous throughout with a mixture of several-celled, unbranched hairs and slightly shorter, gland-tipped hairs, the glandular exudate ill-smelling. Leaves rather thick, oblong-ovate, 1.5-8 cm. broad, 3-15 cm. long, acute at the apex, acute, rounded, truncate or subcordate at the base, entire, crenate, or shallowly lobed near the base; peduncles stout, 1-3 cm. long, often dichotomously branched, several-flowered, pedicels slender, 1-2 cm. long, viscid-villous; calyx 5-7 mm. long, campanulate, the lobes deltoid, slightly shorter than the tube, often short-acuminate; corolla purplish blue, 2-4 cm. in diameter; anthers about 5 mm. long; filaments glabrous; berries globose, dark purple, 1.5-2.5 cm. in diameter; seeds broadly ellipsoid-lenticular, reddish brown, rather coarsely reticulate.

Along the bottoms of canyons, Upper Sonoran Zone; Catalina and Guadalupe Islands, and sparingly on the mainland near the coast in Santa Barbara and San Luis Obispo Counties. Type locality: Santa Catalina Island, California. March-Aug.

Solanum Wallacei var. *Clôkeyi* (Munz) McMinn, Ill. Man. Calif. Shrubs 491. 1939. (*Solanum arborescens* Clôkey, Bull. S. Calif. Acad. 30: 60. 1931. Not *S. arborescens* Moench, 1794; *S. Clôkeyi* Munz, Bull. S. Calif. Acad. 31: 69. 1932.) Similar to *S. Wallacei* in foliage, but the pubescence of shorter, less tawny hairs; corolla 1.5-3.5 cm. in diameter; berries 1-1.5 cm. in diameter, yellow. Santa Cruz and Santa Rosa Islands, Santa Barbara County. Type locality: Pelican Bay, Santa Cruz Island, California. March-July.

13. *Solanum umbelliferum* Eschsch. Blue Witch. Fig. 4501.

Solanum umbelliferum Eschsch. Mém. Acad. St. Pétersb. 10: 283. 1826.

Solanum genistoides Dunal in A. DC. Prod. 13¹: 85. 1852.

A rounded to straggly suffrutescent plant with green, 5-angled or ridged stems 5-12 dm. long, finely pubescent throughout with simple, forked, and few-branched, nonglandular hairs. Leaves elliptic-ovate, entire or rarely lobed or pinnatifid toward the base, 1.5-5 cm. long, acute to obtuse at the apex, tapering to a petiole 4-8 mm. long, rather thickish; peduncles 1 cm. long or less, sometimes almost lacking; pedicels slender, to 2 cm. long; calyx broadly campanulate, 4-5 mm. long, the lobes deltoid, shorter than the tube; corolla blue or infrequently white, 1.5-2 cm. broad, with a pair of greenish glands near the base opposite each of the 5 shallow lobes; anthers yellow or greenish yellow, about 4 mm. long; filaments glabrous; berry

globose, 8–15 mm. in diameter, whitish but darker green near the base; seeds broadly oval-ellipsoidal, lenticular, 2–2.2 mm. long, 1.8 mm. broad, finely and lightly reticulate.

Hillsides, along canyons and ravines and in openings in the chaparral, Upper Sonoran and Transition Zones; Coast Ranges from Mendocino County to Santa Barbara County, and occasional in southern California to northern Lower California; sparingly to southern Arizona. Type locality: California. March–July, but flowering lightly throughout the year.

Solanum umbelliferum var. *incanum* Torr. Pacif. R. Rep. 7³: 17. 1855. (*Solanum californicum* Dunal in A. DC. Prod. 13¹: 86. 1852; *S. umbelliferum* var. *californicum* Parish, Proc. Calif. Acad. III. 2: 172. 1901.) Differing from the species in having the stems, and sometimes the leaves, densely white-tomentose with closely intertangled, several-branched hairs. Coast Ranges, Contra Costa County, southward to Ventura County, California. Type locality: San Antonio River, southern Monterey County. Feb.–Oct.

14. *Solanum sisymbriifolium* Lam. Viscid Nightshade. Fig. 4502.

Solanum sisymbriifolium Lam. Tab. Encycl. 2: 25. 1793.

A robust annual 5–15 dm. tall, armed with bright yellow, somewhat flattened prickles on stems, main veins of the leaves and calyces, and viscid-villous throughout. Leaves thin, ovate in outline, 3–8 cm. wide, 10–25 cm. long, pinnatifid with oblong, toothed or serrate lobes, these acute at the apex; flowers cymose; sepals lanceolate, 7–9 mm. long; corollas 3–3.5 cm. wide, light blue or white, stellate-pubescent outside; anthers alike, about 1 cm. long, linear-lanceolate; berry globose, orange-red, 1–2 cm. in diameter, nearly included in the accrescent, prickly calyx-lobes; seeds orange-yellow, about 2 mm. long, finely foveolate with comparatively coarse ridges separating the depressions.

Introduced at a number of localities from Oregon to southern California, and along the Atlantic seaboard. Introduced from tropical America. Type locality: "In agro Bonariense. Commerson." June–Oct.

15. *Solanum rostratum* Dunal. Buffalo Bur. Fig. 4503.

Solanum rostratum Dunal, Hist. Sol. 234. pl. 24. 1813.

Solanum heterandrum Pursh, Fl. Amer. Sept. 156. pl. 7. 1814.

Androcera lobata Nutt. Gen. 1: 129. 1818.

Androcera rostrata Rydb. Bull. Torrey Club 33: 150. 1906.

Annual with erect, moderately branched stems 4–8 dm. tall, and densely stellate-pubescent herbage usually well-armed with yellow, subulate spines on stems, petioles, main veins of leaves and calyces. Petioles 0.5–5 cm. long; leaves oval or ovate in outline, irregularly pinnately 3–7-lobed or once or twice pinnatifid, to 5 cm. wide and 12 cm. long, the lobes oblong or sub-orbicular, rounded or obtuse; flowers yellow, 2–2.5 cm. broad, stellate-pubescent without, the calyx armed with spines 5–15 mm. long; anthers dimorphic, the lower one 9–10 mm. long, the others about 6 mm. long; berry about 1 cm. in diameter, closely invested by prickly calyx-lobes; seeds black, 3–3.5 mm. long; dull, deeply and finely foveolate.

Dry soil on the prairies from South Dakota to Texas and Mexico; adventive as a weed in Oregon and California and from Ontario to Florida. Type locality: probably on the banks of the Missouri. May–Sept.

16. *Solanum elaeagnifolium* Cav. Silver-leaved Nettle or Bull Nettle. Fig. 4504.

Solanum elaeagnifolium Cav. Ic. 3: 22. pl. 243. 1794.

Solanum leprosum Ort. Hort. Matr. Dec. 115. 1800.

Solanum flavidum Torr. Ann. Lyc. N.Y. 2: 227. 1828.

Solanum texense Engelm. & Gray, Bost. Journ. Nat. Hist. 5: 227. 1845.

Solanum Roemerianum Scheele, Linnaea 21: 767. 1848.

Perennial to 1 m. high from underground rhizomes, the foliage and stems silvery canescent with dense finely stellate pubescence; stems, petioles and midribs sparsely to densely prickly or rarely unarmed. Leaves linear, oblong, or lanceolate, 0.4–2.5 or rarely 3.5 cm. wide, 3–10 cm. long, narrowed or rounded at the base, obtuse or acute at the apex, repand-dentate or smaller upper ones sometimes entire; flowers cymose; peduncles, pedicels and calyces usually prickly with straight yellow spines to 4 mm. long; calyx-lobes ovate to lance-linear, to 1 cm. long; corollas 2–3 cm. in diameter, violet or blue, stellate-pubescent on outside; anthers 7–9 mm. long; berry globose, 10–14 mm. in diameter, yellow or brownish, smooth and glabrous; seeds ovoid, flattened, 3.5–4 mm. long, dark brown.

Dry, sandy plains, Sonoran Zones; Arizona to Texas and Kansas; an introduced weed in southern California and at numerous localities in the San Joaquin and Sacramento Valleys. Type locality: "Habitat in America calidiore." May–Oct.

17. *Solanum marginatum* L. f. White-margined Nightshade. Fig. 4505.

Solanum marginatum L. f. Suppl. 147. 1781.

Solanum abyssinicum Jacq. ex Vitm. Summa Pl. 1: 492. 1789.

A robust shrub 10–15 dm. tall, with the stems and both sides of the leaves armed with scattered yellow, stout spines 2–10 mm. long and the stems and lower surfaces of the leaves velvety-tomentose with fine, several-rayed, stellate hairs. Leaves broadly ovate, 5–12 cm. broad, 8–20 cm. long, coarsely sinuate-lobate with lobes 1–2 cm. long, 1.5–3.5 cm. wide, these usually obtuse or rounded, the upper surface densely tomentose in youth, but the pubescence deciduous from the center outward, leaving a white band of tomentum around the margins until the leaf is quite old, finally the whole upper surface green and subglabrate; peduncles stout, 1–2 cm. long, few-flowered; calyx 8–12 mm. long, densely tomentose, the lance-deltoid

lobes slightly longer than the tube; corolla 2.5–3.5 cm. in diameter, white with a star of purple extending outward toward the tips of the lobes, pubescent inside and outside; berry to 4 cm. in diameter, yellowish, smooth and shining; seeds orbicular-lenticular, 3 mm. in diameter, minutely papillose-granular.

Escaped from gardens and sparingly established in San Francisco and near Monterey, California. Native of Africa. Type locality: Abyssinia. May–Aug.

Solanum lanceolatum Cav. Ic. 3: 23. pl. 245. 1794. A shrub 1–2.5 m. tall with stellate-tomentose stems armed with stoutish, short prickles or sometimes unarmed. Leaves oblong, elliptic-lanceolate or oblanceolate, 8–18 cm. long, the upper ones entire, the lower irregularly lobed below the middle, densely stellate-tomentose beneath, the upper surface becoming green in age; cymes many-flowered, somewhat paniculate; corollas pale blue or purplish blue, 12–15 mm. in diameter, berry orange-yellow. Reported to be established as a troublesome weed in parts of southern California. Type locality: Mexico.

18. *Solanum carolinense* L. Carolina Horse Nettle. Fig. 4506.

Solanum carolinense L. Sp. Pl. 187. 1753.

A green, rhizomatous, finely stellate-pubescent, erect plant 3–12 dm. tall, armed with slender, rigid, yellowish spines 2–5 mm. long on the stems, petioles, midribs and sometimes the main lateral veins of the leaves. Leaves ovate to oblong, repand, lobed, or rarely pinnatifid, 2–7 cm. wide, 3.5–15 cm. long, the lobes obtuse, or less commonly acute, both surfaces stellate-pubescent with yellowish hairs; petioles 3–20 mm. long; flowers cymose-racemose, surpassing the leaves and at anthesis appearing terminal, in fruit obviously lateral; pedicels 5–15 mm. long; calyx-lobes lanceolate-acuminate, 5–7 mm. long, lightly spinose near the base; corolla 2–3.5 cm. in diameter, the lobes ovate-lanceolate, 6–7 mm. long, stellate-puberulent without, glabrous or sparsely stellate-puberulent within, white or pale bluish; anthers somewhat unequal, 5–9 mm. long; berries globose or slightly depressed, 9–20 mm. in diameter, orange-yellow, smooth and glabrous; seeds bright yellow, obovoid-lenticular, about 2.5 mm. long, minutely and shallowly reticulate-pitted, glossy.

A weed in fields and waysides, Ontario to Connecticut, Florida and Texas, established as a weed in scattered localities in Oregon, Idaho, California, and Arizona. Type locality: Carolina. May–Aug.

Lycopersicon esculentum Mill. Gard. Dict. ed. 8. no 2. 1768. The cultivated tomato with viscid-pubescent stems and foliage, pinnately divided leaves and toothed or lobed segments, yellow flowers and large, red, glabrous fruit, has escaped from cultivation and occurs occasionally as a spontaneous plant throughout much of the United States and Mexico. When growing wild the fruits are often much reduced in size.

8. *DATÙRA* L. Sp. Pl. 179. 1753.

Coarse, erect or ascendingly branched, rank-smelling herbs (in ours) with alternate, short-petioled, entire, sinuate or lobed blades. Flowers large and showy, solitary in forks of branches, short-pedunculate, ours white or purple-tinged, heavily fragrant. Calyx cylindric or prismatic, 5-toothed, usually circumscissile near the base, the lower part persistent below the capsule as a spreading or reflexed collar. Corolla funnelform, convolute-plicate in bud. Stamens included; filaments filiform. Stigma bilobed. Capsule ovoid to globose, spinose, 4-valved apically or dehiscent irregularly, falsely 4-celled. [Name from the Hindu, *dhatura*.]

A genus of about 25 species, widely distributed in the tropical and temperate parts of all continents. Type species, *Datura Stramonium* L.

Calyx tubular; corolla 15–20 cm. long; seeds light brown or buff when mature, smooth on the sides, with a cord-like margin; perennial. 1. *D. meteloides*.

Calyx prismatic; corolla 6–12 cm. long; seeds dark brown to black, verrucose and pitted on the sides, the margin rounded, not cord-like; annual.

Capsule erect, ovoid, puberulent to glabrate; stems green or purplish, glabrous or sparsely puberulent, not cinereous; corolla 6–8 cm. long.

Calyx-teeth unequal, 5–10 mm. long; spines on capsule 3–10 mm. long, not greatly broadened at the base; capsule 4-valved. 2. *D. Stramonium*.

Calyx-teeth nearly equal, 3–4 mm. long; spines on capsule 8–22 mm. long, 4–10 mm. broad at the base; capsule 2-valved or splitting irregularly. 3. *D. ferox*.

Capsule nodding, globose, densely glandular-pubescent; stems densely puberulent, cinereous. 4. *D. discolor*.

1. *Datura meteloides* A. DC. Tolguacha. Fig. 4507.

Datura meteloides A. DC. Prod. 131: 544. 1852.

Erect, widely branching perennial 5–15 dm. tall, with cinereous-puberulent herbage. Leaves ovate, 4–15 cm. long, entire to sinuately and irregularly repand, asymmetric at the base, petioles shorter than to nearly equaling the blade; calyx 7–10 cm. long, 5-toothed, the basal persistent part usually rotate, sometimes reflexed; corolla white, suffused with violet or lavender, 15–20 cm. long, the limb 10–20 cm. wide, bearing 5 slender teeth about 1 cm. long; anthers white, 1.5 cm. long; capsule globose, 3–4 cm. in diameter, densely prickly and puberulent, often glabrate, when mature, rupturing irregularly, the spines 5–12 mm. long; seeds cream or buff to light brown, ovoid-reniform, flattened, about 5 mm. long, smooth on the sides, the margin cord-like.

Sandy flats, fields, and dry hills, Sonoran Zones; lower Sacramento Valley, Inyo County, and southern Coast Ranges, California, to Texas and southward through Mexico to northern South America. Type locality: Mexico. April–Oct.

2. *Datura Stramonium* L. Jimson-weed. Fig. 4508.*Datura Stramonium* L. Sp. Pl. 179. 1753.

Simple to spreadingly branched erect annual 3-15 dm. tall with green, sparsely puberulent to glabrate stems and foliage. Leaves ovate to elliptic, 5-20 cm. long, sinuately to laciniately lobed, or petioles about one-half as long as the blade; calyx 3.5-4.5 cm. long, the teeth unequal, 5-10 mm. long, the persistent basal portion reflexed in fruit; corolla white, 6-8 cm. long, the limb 3-5 cm. broad, bearing 5 subulate teeth 5-8 mm. long; capsule erect, ovoid, 3.5-5 cm. long, armed with spines 3-10 mm. long, or sometimes unarmed, finely and sparsely puberulent to glabrate, dehiscing from apex by 4 valves; seeds black, rugulose and finely pitted.

In waste places throughout most of the United States; southward through Mexico into northern South America; introduced in warmer parts of Europe, Asia, and Africa. Type locality: "Habitat in America, nunc vulgaris per Europam." June-Sept.

Datura Stramonium var. *Tátula* (L.) Torr. Fl. N. Mid. U.S. 232. 1824. (*Datura Tatula* L. Sp. Pl. ed. 2. 1: 256. 1762.) Stems purplish; corolla with white limb and deeply violet or purple-flushed throat; spines of fruits tending to be more uniform in length than in the species. Oregon southward to tropical America. Type locality: not given.

3. *Datura ferox* L. Chinese Datura or Thorn-apple. Fig. 4509.*Datura ferox* L. Amoen. Acad. 3: 403. 1756.

An openly branched coarse herb 2.5-4.5 dm. tall, with sparsely pubescent to glabrate stems and herbage. Petioles slender, 3-8 cm. long; leaf-blades broadly ovate, 5-15 cm. broad, to 2 dm. long, obtuse to truncate at the base, obscurely pentagonal in outline, the margins coarsely sinuate-dentate; flowers erect; pedicels 1-2 cm. long; calyx 3-4 cm. long, the teeth rounded, triangular, acuminate, 3-4 mm. long, nearly equal; corolla 6-8 cm. long, the limb 2.5-3.5 cm. broad, teeth slender, 3-5 mm. long; capsule ovoid, 4-5 cm. long, sparsely puberulent, heavily armed with spines 1-3 cm. long, the larger to 1 cm. broad at the base; seeds reniform, 5-5.5 mm. long, rugulose and minutely pitted, light brown.

A native of Asia sparingly established in the northern Sacramento Valley. Type locality: "Habitat in China." May-July.

4. *Datura discolor* Bernh. Desert Thorn-apple. Fig. 4510.*Datura discolor* Bernh. Linnaea 8: Litt. Ber. 138. 1833.*Datura Thomasii* Torr. Pacif. R. Rep. 5: 362. 1856.

Erect annual 2-6 dm. tall with finely puberulent, green or somewhat cinereous herbage. Leaves broadly ovate, sinuately and angularly few-toothed to entire, 3-15 cm. long, petioles one-fourth to one-half as long as the blade; calyx prismatic, 4-7 cm. long, the persistent basal part mostly rotate; corolla white with purplish flush in throat, 10-15 cm. long, the limb 5-8 cm. broad; the teeth 4-7 mm. long, narrowly subulate; anthers white; capsules nodding, globose, 2.5-3 cm. in diameter, heavily spinose, glandular-puberulent, the spines 1-2 cm. long; seeds black, rugulose and finely pitted.

Sandy flats, dry stream beds, and margins of cienagas, Lower Sonoran Zone; Colorado Desert into Arizona, West Indies, Sonora, and Lower California. Type locality: West Indies. March-Oct.

9. *NICOTIANA* [Tourn.] L. Sp. Pl. 180. 1753.

Narcotic-poisonous, heavy-scented, usually viscid-puberulent annual or perennial herbs or shrubs. Leaves alternate, entire, or sometimes repand, petiolate or sessile. Inflorescence few- to many-flowered, racemose or paniculate, terminal. Calyx tubular-campanulate or ovoid, 5-toothed or 5-cleft, persistent. Corolla funnelform, salverform, or tubular, the shallowly 5-lobed limb usually spreading. Stamens 5; filaments filiform, inserted near the base of the corolla-tube. Style slender; stigma capitate. Ovary 2-celled or rarely 4-celled. Capsule ovoid, acute, 2- or 4-valved at the summit. Seeds numerous, small, ovoid to reniform, minutely reticulate-punctate. [Named for Jean Nicot, who introduced tobacco into France from Portugal.]

A genus of about 30 species in North and South America, Australia, and a few islands of the Pacific. Type species, *Nicotiana Tabacum* L.

Shrubs; flowers yellow; leaves glaucous, glabrous.

1. *N. glauca*.

Herbs; flowers white, greenish white or pale cream, sometimes tinged with violet; leaves glandular and pubescent.

2. *N. trigonophylla*.

Leaves auriculate-clasping at the base; plants biennial or perennial.

Leaves not auriculate-clasping; plants annual.

Stamens inserted nearly equally at bottom of throat or at apex of corolla-tube proper; corolla-limb 6-20 mm. wide.

Cauline leaves petioled; corolla 2-4 cm. long, not constricted at orifice.

Calyx-lobes acute, subequal, shorter than or about equaling the tube, not obviously striped; calyx-tube strongly pock-marked at maturity; corolla-limb 6-12 mm. broad; herbage sparsely glandular.

3. *N. attenuata*.

Calyx-lobes linear-lanceolate, unequal, mostly exceeding the tube, each with an obvious dark median stripe; calyx-tube sparingly or not at all pock-marked; corolla-limb 12-22 mm. broad; herbage densely viscid-glandular.

4. *N. acuminata multiflora*.

Cauline leaves sessile, or few lower ones petioled; corolla 1.5-2 cm. long, distinctly constricted just below the orifice.

5. *N. Clevelandii*.

Stamens unequally inserted high in throat of corolla; corolla-limb 2-5 cm. broad.

6. *N. Bigelovii*.

1. *Nicotiana glauca* R. Graham. Tree Tobacco or Mexican Tobacco. Fig. 4511.

Nicotiana glauca R. Graham, Edinb. Phil. Journ. 1828: 174. 1828.

Glabrous shrub or small tree 8 m. high or less, with ample, long-petiolate, glaucous, somewhat leathery ovate to lanceolate-oblong leaves 5–18 cm. long, the blades acute or obtuse at the apex, acute to subcordate at the base, entire or slightly repand; flowers greenish yellow, in lax terminal panicles; calyx tubular-campanulate, 8–12 mm. long, 5-dentate, the teeth much shorter than the tube; corolla tubular, 3–4.5 cm. long, minutely villosulose, the limb narrow; capsule ovoid, acute, 10–13 mm. long, 4-valved at the summit; seeds reddish brown, slightly shining, finely favose-reticulate.

A native of South America, established and spontaneous from central California to Texas, and southward throughout Mexico; mostly in the Lower and Upper Sonoran Zones. Type locality: described from cultivated specimens grown from seed collected at Buenos Aires, Argentina. April–Nov.

2. *Nicotiana trigonophylla* Dunal. Desert Tobacco. Fig. 4512.

Nicotiana trigonophylla Dunal in A. DC. Prod. 13¹: 562. 1852.

Nicotiana ipomopsisiflora Dunal in A. DC. op. cit. 559.

Nicotiana multiflora Torr. Pacif. R. Rep. 5: 362. 1856.

Nicotiana glandulosa Buckl. Proc. Acad. Phila. 1862: 166. 1863.

Erect, simple or branched biennial or perennial herb 2–9 dm. tall, glandular-pubescent throughout; lower leaves petiolate, oblanceolate or spatulate, 1–4 cm. wide, 5–15 cm. long, tapering gradually to the more or less winged petiole; upper leaves lanceolate to oblong-ovate, sessile, auriculate, smaller; inflorescence laxly paniculate-racemose; pedicels 5–10 mm. long; calyx campanulate-ovoid, 3–4 mm. wide, 7–10 mm. long, the teeth lance-triangular, 3–5 mm. long, about equaling the mature capsule; corolla white, tubular, 12–18 mm. long, slightly constricted at the orifice, the limb 8–10 mm. broad; capsules 2-valved, each valve bilobed at the apex; seeds numerous, dark reddish brown, somewhat shining.

Sandy areas and along washes, mostly Lower Sonoran Zone; Mojave and Colorado Deserts to Nevada, Texas, Nayarit, and southern Lower California. Type locality: "In Mexico ad Aguas calientes." Nov.–June.

3. *Nicotiana attenuata* Torr. Coyote Tobacco. Fig. 4513.

Nicotiana attenuata Torr. ex S. Wats. Bot. King Expl. 276. pl. 27. 1871.

Nicotiana Torrejana Nels. & Macbr. Bot. Gaz. 61: 43. 1916.

Nicotiana caesia Suksd. Werdenda 1: 37. 1927.

Erect simple or branching annual 3–10 dm. high, glandular-pubescent throughout, or somewhat glabrate in age. Leaves petiolate, the lower 2–5 cm. wide, 8–15 cm. long, ovate to broadly lanceolate, the upper narrower and sometimes sessile, mostly acute at both ends; inflorescence racemose or paniculate-racemose; calyx ovoid-campanulate, 6–8 mm. high at anthesis, pock-marked when mature, the teeth deltoid, subequal, shorter than the tube; corolla narrowly funnelform, white, the tube 2–2.5 cm. long, essentially glabrous except near apex, the limb 8–10 mm. broad; corolla-lobes obtuse, 2–3 mm. long; capsule 8–10 mm. long, 4-valved at the apex; seeds 0.5–0.7 mm. long, dull.

Washes, sandy slopes, roadsides and fields, mostly Arid Transition and Upper Sonoran Zones; rare in the desert, Washington and Idaho to southern California, Arizona, New Mexico, and Texas. Type locality: Carson City, Nevada. May–Nov.

4. *Nicotiana acuminata* Hook. var. *multiflora* Reiche. Many-flowered Tobacco. Fig. 4514.

Nicotiana multiflora Phil. Linnaea 33: 197. 1864.

Nicotiana acuminata var. *multiflora* Reiche, Anal. Univ. Chile 125: 460. 1910.

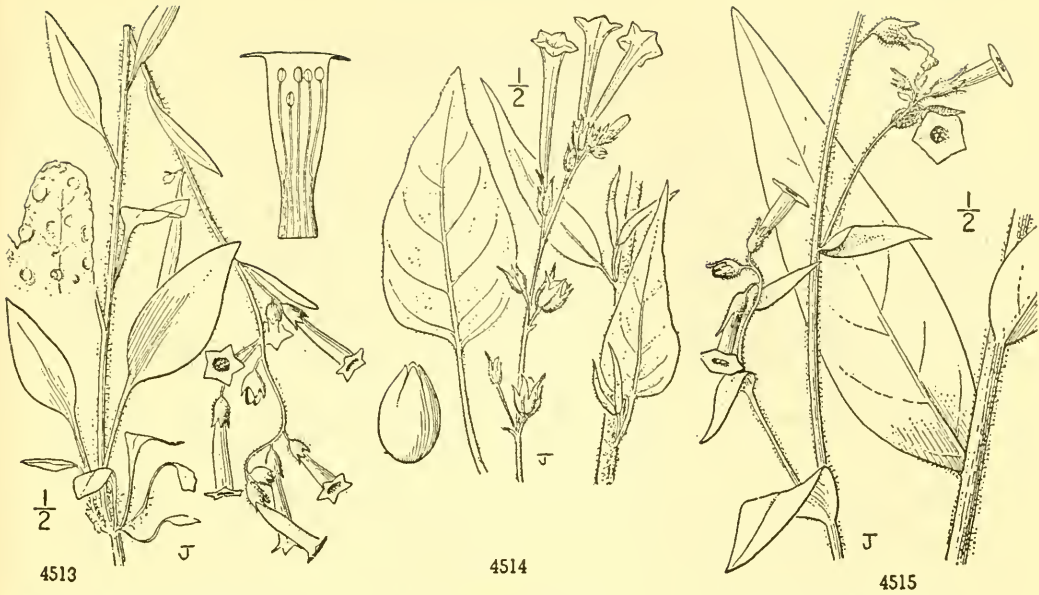
Erect, simple to spreadingly branched herb 5–15 dm. high with ill-smelling, densely glandular-pubescent herbage. Petioles 1–6 cm. long; leaf-blades narrowly ovate-lanceolate to lanceolate, acute to acuminate, or the upper sometimes attenuate, 0.5–3.5 (rarely 5) cm. broad, 5–25 cm. long, obtuse to shallowly subcordate at the base, entire or the margins, slightly undulate; flowers in loosely branching panicles; calyx 8–12 mm. long, with 5 dark stripes extending from base of calyx to tip of the linear-lanceolate lobes, these unequal, mostly equaling to twice as long as the calyx-tube; corollas narrowly tubular, 3–4.5 cm. long, the limb 12–22 mm. broad, greenish white, closed during day, the tube proper barely equaling calyx-lobes, considerably narrower than the gradually spreading throat; capsules ovoid, 10–12 mm. high.

Native in South America but naturalized at numerous localities in California in the central Sierra foothills from Madera County to Eldorado County and in the lower Coast Ranges from Napa County to San Benito and Monterey Counties. Type locality: Choapa, Chile. June–Oct.

5. *Nicotiana Clevelandii* A. Gray. Cleveland's Tobacco. Fig. 4515.

Nicotiana Clevelandii A. Gray, Syn. Fl. N. Amer. 2¹: 242. 1878.

Viscid-pubescent, erect annual 2–6 dm. high, simple to freely branched. Leaves ovate to lanceolate, acute, the lower usually short-petiolate, the upper sessile, 3–8 cm. long, the petioles narrowly winged; inflorescence racemose, comparatively few-flowered; calyx campanulate, the tube about 3–4 mm. long, 2–3 mm. wide, the teeth linear, unequal, 1.5–5 mm. long, the longer exceeding the tube; corolla 1.5–2 cm. long, whitish tinged with violet, glabrous or sparsely



4513. *Nicotiana attenuata*

4514. *Nicotiana acuminata*

4515. *Nicotiana Clevelandii*

puberulent without near the summit, limb 8-10 mm. broad; capsule 5-8 mm. high, 4-valved; seeds reddish brown, punctate-reticulate, shining.

Sandy washes and hillsides, Sonoran Zones; Santa Barbara County to the Colorado Desert and southern Lower California. Type locality: Chollas Valley, near San Diego, California. Feb.-June.

6. *Nicotiana Bigelovii* (Torr.) S. Wats. Indian Tobacco. Fig. 4516.

Nicotiana plumbaginifolia var. *Bigelovii* Torr. Pacif. R. Rep. 4: 127. 1857.

Nicotiana Bigelovii S. Wats. Bot. King Expl. 276. pl. 27. figs. 3-4. 1871.

Ascendingly branched annual 3-15 dm. tall with glandular-pubescent, ill-smelling herbage. Leaves sessile or the lower petiolate, ovate-oblong to narrowly lanceolate, 5-20 cm. long, often acute at both ends; flowers distributed in open racemes along branches; calyx 1.5-2.2 cm. long, the narrowly lanceolate teeth unequal, the longer ones about equaling the tube; corolla 4-7 cm. long, the limb 3-5 cm. broad, white, faintly tinged with green; stamens unequally inserted in upper part of throat; capsule ovoid, about 1.5 cm. long, exceeded by calyx lobes.

Along streams, on foothills and valley floors, Upper Sonoran and lower edge of Transition Zones; southern Oregon to southern California where it grades into the variety. Type locality: Knights Ferry, Stanislaus County, California. May-Oct.

Nicotiana Bigelovii var. *Wallacei* A. Gray, Syn. Fl. N. Amer. 2: 243. 1878. Corolla-limb 2-3 cm. broad; capsule nearly equaling to slightly surpassing the calyx-lobes at maturity. Vicinity of Santa Barbara southward into San Diego County. Type locality: Los Angeles. April-Oct.

Nicotiana quadrivalvis Pursh (Fl. Amer. Sept. 1: 141. 1814), described from specimens cultivated by tribes along the Missouri River, has a subglobose, 4-celled capsule, and *Nicotiana multivalvis* Lindl. (Bot. Reg. 13: pl. 1057. 1827), described from garden plants grown from seeds collected by Douglas along the Columbia, has a large, globose capsule with several cells. They are thought to be strains of *N. Bigelovii* that arose in the fields of tobacco cultivated by the northwestern Indians, and are sporadically distributed throughout that area.

Nicotiana rustica L. (Sp. Pl. 180. 1753) has appeared on ballast at Linnton, Oregon. Type locality: "Habitat in America."

10. *PETUNIA* Juss. Ann. Mus. Paris 2: 215. 1803.

Annual or perennial viscid herbs with alternate or subopposite, entire leaves. Flowers solitary in the axils or terminal, white, violet, or purple, minute to large and showy. Calyx 10-nerved, deeply 5-lobed. Corolla funnelform. Stamens 5, of 3 different lengths, inserted near base of corolla-tube. Stigma capitate, obscurely bilobed. Capsule ovoid, septically bivalved. Seeds small, subspherical. [Name from *Petun*, an Indian name for tobacco.]

A genus of approximately 40 species, mostly in South America. Type species, *Petunia parviflora* Juss.

1. *Petunia parviflora* Juss. Wild Petunia. Fig. 4517.

Petunia parviflora Juss. Ann. Mus. Paris 2: 216. pl. 47. fig. 1. 1803.

Prostrate annual with diffusely branched stems 1-4 dm. long, and glandular-viscid herbage. Leaves linear, elliptic, or oblong-oblancoate, 8-18 mm. long, gradually narrowed to a short petiole, or nearly sessile; calyx lobes linear-lanceolate, 2-3 mm. long in flower, 5-6 mm. long in fruit, the cup 1-2 mm. deep; corolla 5-7 mm. long, pale blue to purplish, usually lighter or white on one side, lobes spreading, rounded, apiculate; capsule ovoid, 3-4 mm. long; seeds about 0.6 mm. long, amber or pale brown, favose-reticulate.

Sandy arroyos and flats, Sonoran Zones; Sacramento Valley and Central Coast Ranges to Arizona, Texas, Florida, and Mexico and in South America. Type locality: La Plata River, Brazil. May-Sept.

Family 136. **SCROPHULARIACEAE.***

FIGWORT FAMILY.

Herbs, shrubs, or rarely vines, with simple opposite or alternate exstipulate leaves. Flowers perfect, racemose or paniculate. Hypanthium free from the ovary. Sepals 5 or 4, distinct or united. Corolla 4–5-lobed, usually 2-lipped, rarely campanulate or rotate and nearly regular. Stamens rarely 5, usually 4 and didynamous, sometimes only 2. Carpels 2, the ovaries wholly joined and with axile placentation, the styles usually also united, and the stigmas either distinct or united. Capsule dehiscent septically or loculicidally or both, or even loculicidally by valves, ruptures, or terminal poroid openings. Seeds many to few, wingless or winged, and with fleshy endosperm.

About 200 genera and 3,000 species, of wide geographical distribution, but especially numerous in western North America.

Corolla with the upper lobes external, overlapping in the bud.

Stigmas distinct, flattened (except in *Limosella*); seeds wingless, reticulate to smooth; inflorescence simply racemose; leaves opposite. (*Gratiolaceae*)

Plants caulescent; anther-cells distinct; capsule 2-celled throughout.

Sepals equal in width or nearly so; corolla nearly 2-lipped.

Connective not expanded, nor anther-cells parallel; corolla pubescent within on lower side or glabrous.

Cells of anther contiguous, either divaricate or divergent; corolla 2-ridged within on lower side; pedicels ebracteolate.

Capsule septical, the plate-like septum persisting; anterior filaments adherent as hairy ridges on corolla, and then projecting as sterile knobs, their distal portions glabrous and upcurved-erect; sepals distinct. 1. *Lindernia*.

Capsule loculicidal; all filaments simple and attached to corolla only near base; sepals united at least one-half their length.

Upper corolla-lip (as in *Lindernia*) shorter and with acute lobes, the corolla violet-blue; capsule globose, distally exposed by the spreading calyx-lobes; bracts minute, subulate. 2. *Mazus*.

Upper corolla-lip with rounded lobes, the corolla (in ours) yellow, purple, or red; capsule longer than wide, its basal half or all its body surrounded by the erect or cylindric calyx; bracts foliose. 3. *Mimulus*.

Cells of anther separated on short arms of the connective; corolla violet or nearly so, not ridged within on lower side; pedicels bibracteolate. 4. *Stemodia*.

Connective expanded, wider than the parallel anther-cells; corolla pubescent within over bases of upper lobes. 5. *Gratiola*.

Sepals unequal in width, the two innermost much the narrowest; corolla white, campanulate. 6. *Bacopa*.

Plants acaulescent; anther-cells wholly confluent; corolla nearly rotate; capsule distally 1-celled. 7. *Limosella*.

Stigmas wholly united, punctiform or capitate; seeds not reticulate, but either smooth, tuberculate, ridged, or winged.

Capsule primarily septical, its walls firm or woody; corolla neither saccate nor spurred on lower side; filaments 5, rarely 4 in *Scrophularia*.

Leaves alternate; inflorescence racemose or spicate; corolla rotate, its lobes longer than the tube; filaments all with anthers. (*Verbasceae*) 8. *Verbascum*.

Leaves opposite; inflorescence compound, usually paniculate; corolla nearly campanulate to tubular; uppermost filament lacking anther. (*Cheloneae*)

Uppermost filament slender, glabrous or bearded, decurved to lower side of throat; corolla 10–40 mm. long, yellow, blue, purple, red, or white, the orifice rounded and the lower lobes spreading; sepals distinct. 9. *Penstemon*.

Uppermost filament flattened and glabrous, or wanting; corolla 6–12 mm. long, brown, its antero-lateral lobes vertically placed and the lowermost (mid-anterior) lobe often deflexed; sepals joined proximally. 10. *Scrophularia*.

Capsule partly or wholly loculicidal; corolla gibbous or spurred at base; filaments 4 or sometimes 2.

Corolla gibbous on upper side of base, blue, violet, or purple; capsule thin-walled, dehiscent longitudinally septically and loculicidally; seeds few, smooth; leaves opposite. (*Collinsiae*)

Corolla papilionaceous, the 2 uppermost lobes transversely erect and usually paler, the 2 antero-lateral lobes horizontally flattened and concealing the sagittally folded mid-anterior (lowermost) lobe within which lie the anthers and stigmas; filaments glabrous, at least distally; leaf-blades entire to dentate. 11. *Collinsia*.

Corolla nearly rotate; filaments exerted, all pubescent; leaf-blades mostly trilobed to tripartite. 12. *Tonella*.

Corolla gibbous or spurred on lower side of base, yellow, blue, violet, or red; capsule dehiscent by transverse loculicidal ruptures, valves, or poroid openings; seeds many, angled, alveolate, cyathiform, or winged; leaves usually alternate. (*Antirrhineae*)

Capsule symmetrical, globose or cylindric, the cells equal or nearly so and opening their entire width.

Antheriferous stamens 4, didynamous; seed-margins not striate nor incurved.

Leaves opposite or ternate throughout; corolla tubular, red, gibbous at base; stem shrubby. 13. *Galvezia*.

* Text contributed by Francis Whittier Pennell, except for the genera *Penstemon* and *Orthocarpus*.

Leaves alternate or scattered (sometimes opposite near base); corolla wider, yellow, purple, or violet-blue; stem herbaceous.

Corolla gibbous at base anteriorly, the pouch or spur not longer than wide; stems twining or pendent. 14. *Asarina*.

Corolla spurred at base anteriorly, the spur longer than wide.

Capsule dehiscent by irregular distal ruptures; upper lobes of corolla arched; anthers glabrous, all distinct; plants glabrous.

Leaf-blades linear, pinnately veined, not petioled; flowers in terminal racemes, the bracts shorter than foliage-leaves and pedicels shorter than corollas; plants erect. 15. *Linaria*.

Leaf-blades cordate-reniform, palmately veined, petioled; flowers axillary, the bracts normal foliage-leaves and pedicels much longer than corollas; plants extensively twining. 16. *Cymbalaria*.

Capsule dehiscent by the falling as a lid of most of the external wall of each cell; upper corolla-lobes projecting; anthers coherent, ciliate with stiff hairs; plants hirsute, the stems prostrate. 17. *Kickxia*.

Antheriferous stamens 2, the antero-lateral pair; corolla yellow or yellowish, gibbous at base; seeds cyathiform, the margins striate and strongly incurved. 18. *Mohavea*.

Capsule asymmetrical, the base of the slightly larger anterior cell wholly in front of the pedicel, the posterior cell dehiscent by a single distal pore, the anterior by two pores or these becoming confluent, the capsule-apex decurved and the style deflexed; corolla gibbous at base. 19. *Antirrhinum*.

Corolla with the lower lobes external, overlapping in the bud.

Upper lobes of corolla flattened or widely arched, often spreading; anthers all distinct.

Stigmas distinct, plate-like; stamens 4; anther-cells divaricate; capsule woody, at least primarily septi-cidal. (*Digitaleae*) 20. *Digitalis*.

Stigmas wholly united, punctiform or capitate; stamens 2; anther-cells parallel; capsule not woody, loculicidal. (*Veroniceae*) 21. *Veronica*.

Stem elongating and leafy, the leaf-blades from entire to dentate, short-petioled to sessile; corolla nearly rotate, violet-blue to white.

Stem scapose, erect with bract-like leaves; true foliage leaves all radical, cordate-reniform to pin-natifid. 22. *Synthyris*.

Corolla well-developed, blue or violet-blue; filaments inconspicuously colored; scapes with few bract-like leaves below inflorescence. 23. *Besseyia*.

Corolla (in ours) rudimentary or wanting, and filaments dark red; scapes with many bract-like leaves below inflorescence.

Upper lobes of corolla narrowly arched, forming a definite galea that encloses the anthers; anthers frequently cohering; capsule loculicidal. (*Euphrasieae*)

Cells of anther equal in size and position; seed-coat close, not obviously reticular.

Capsule symmetrical, both cells dehiscent equally.

Seeds turgid, yellow, longer than wide, not winged; corolla with upper lip unappendaged and lower lip spreading.

Corolla yellow; capsule much longer than wide; calyx-lobes alike, lanceolate, little shorter than the tube; inflorescence slender, the isolated flowers and fruits subtended by ascending bracts. 24. *Parentucellia*.

Corolla white, with pink galea; capsule scarcely longer than wide; calyx-lobes unequal, obtuse, the upper longer, hardly half the length of the tube; inflorescence dense, the crowded flowers and fruits subtended by spreading bracts. 25. *Bellardia*.

Seeds flat, nearly circular, broadly winged; capsule no longer than wide, truncate-circular; corolla yellow, the upper lip appendaged and the lower shorter and more appressed. 26. *Rhinanthus*.

Capsule asymmetrical, usually decurved, opening mainly or wholly on the distal side.

Corolla yellow, purple, red, or white, the lower lip obliquely attached, glabrous, without palate, and shorter than the arched galea; anthers distinct, glabrous; seeds dull, not stipitate; leaves alternate (in ours); root perennial. 27. *Pedicularis*.

Corolla white or pinkish, the lower lip straightly attached, with densely pubescent yellow palate and about equaling the projecting galea; anthers cohering, pubescent; seeds somewhat lustrous, blackish, with clavate-stipitate white base; leaves opposite; root annual. 28. *Melampyrum*.

Cells of anther unequally placed, the upper one attached by its middle, the lower cell normally attached but sometimes smaller or lacking; seed-coat usually loose, evidently reticulate; leaves alternate.

Calyx-tube surrounding the proximal portion of the corolla, its 4 (or by fusion 2) lobes laterally placed.

Lower lip of corolla as long as and larger than the galea; plants annual. 29. *Orthocarpus*.

Lower lip of corolla shorter and smaller than the sharper galea; plants mostly perennial, but a few species annual. 30. *Castilleja*.

Calyx-tube surrounding base of corolla or usually wholly to its dorsal side, extending as a narrow tongue-like dorsal structure that is entire or only slightly hidentate at apex. 31. *Cordylanthus*.

1. LINDÉRNIA All. Misc. Taurin. 3: 178. 1766.

Diffuse annual herbs, with opposite denticulate to nearly entire leaves, most or all of which subtend flowers. Bracteoles none. Sepals 5, distinct. Corolla blue-violet, 2-lipped, the upper with short acutish lobes, the lower lip much longer, spreading, within throat with 2 hairy yellow ridges. Filaments 4, didynamous, the upper short and antheriferous, the lower forming the hairy ventral ridges of corolla and projecting from apex thereof as sterile knobs, proximal to which rise 2 processes which in our species lack anthers. Stigmas distinct, lamelliform. Capsule septicidal, the septum persisting as a thin plate. Seeds

smooth or finely lined transversely. [Named in honor of Franz Balthasar von Lindern, an early botanist.]

Species 50 or more, mostly in the warmer parts of the Old World, the following widespread in North and South America. Type species, *Lindernia pyxidaria* All.

Seeds pale yellow, mostly 2 or 3 times as long as wide; lower leaf-blades obviously narrowed at base; pedicels shorter than bracts. 1. *L. dubia*.

Seeds yellow or brownish yellow, mostly one and one-half to two times as long as wide; leaf-blades all widest near base and rounded-clasping. 2. *L. anagallidea*.

1. *Lindernia dubia* (L.) Pennell. Short-stalked *Lindernia*. Fig. 4518.

Gratiola dubia L. Sp. Pl. 17. 1753.

Capraria gratioides L. Syst. Veg. ed. 10. 1117. 1759.

Ilysanthes riparia Raf. Ann. Nat. 13. 1820.

Ilysanthes gratioides Benth. in A. DC. Prod. 10: 419. 1846.

Ilysanthes dubia Barnhart, Bull. Torrey Club 26: 376. 1899.

Lindernia dubia Pennell, Monog. Acad. Phila. No. 1: 141. 1935. (The plant of the Pacific States is the shorter-pedicelled *L. dubia* subsp. *major* (Pursh) Pennell, op. cit. 146.)

Plant glabrous, 1–3 dm. tall, widely branched. Leaf-blades 1–3 cm. long, narrowly elliptic to elliptic-lanceolate or ovate, the lower narrowed but the upper rounded or clasping at base; pedicels 5–12 mm. long; corolla 9–10 mm. long, those of the later flowers mostly falling unopened; capsule 4 mm. long.

Stream margins, Upper Sonoran and Transition Zones; Washington to northern California, also widespread over eastern North America, and occurring far southward to southern South America. Type locality: Virginia. July–Sept.

2. *Lindernia anagallidea* (Michx.) Pennell. Long-stalked *Lindernia*. Fig. 4519.

Gratiola anagallidea Michx. Fl. Bor. Amer. 1: 6. 1803.

Lindernia anagallidea Pennell, Mon. Acad. Phila. No. 1: 152. 1935.

Plant glabrous, usually 0.5–2 dm. tall, widely branched. Leaf-blades 0.5–1.2 cm. long, ovate, rounded or clasping at base (or lowermost slightly narrowed); pedicels 10–25 mm. long, lowermost sometimes shorter; corolla 7–9 mm. long, apparently all opening; capsule 4–5 mm. long.

Sandy margins of streams and ponds, Lower Sonoran Zone to Transition Zone; Washington to middle California, also widespread over eastern North America, and occurring far southward to southern South America. Type locality: South Carolina. July–Sept.

2. MÀZUS Lour. Fl. Cochinch. 385. 1790.

Diffuse annual or biennial herbs, with opposite leaves, those subtending the flowers scattered, minute, and linear-subulate. Bracteoles none. Sepals 5, united about one-half their length. Corolla blue-violet, 2-lipped, the upper lip with short acutish lobes, the lower much longer, spreading, ventrally with 2 finely pubescent pale ridges (with yellow cross areas). Filaments 4, didynamous, all antheriferous. Stigmas distinct, lamelliform. Capsule loculicidal, dehiscing even through septum. Seeds minutely reticulate. [Named from the Greek, referring to the teats or tubercles in the mouth of the corolla.]

About 20 species, mostly of southeastern Asia. Type species, *Mazus rugosus* Lour.

1. *Mazus japonicus* (Thunb.) Kuntze. Japanese *Mazus*. Fig. 4520.

Lindernia japonica Thunb. Fl. Jap. 253. 1784.

Mazus japonicus Kuntze, Rev. Gen. Pl. 1: 462. 1891.

Plant loosely pubescent, 0.5–1.5 dm. tall. Leaves mostly near base, the blades usually 1–3 cm. long, cuneate-ovate, sinuately dentate or denticulate; pedicels 5–7 mm. long; calyx 5–8 mm. long, its lobes lance-ovate; corolla 7–10 mm. long; capsule 3–4 mm. long.

Lawns and grassy waysides, Portland, Oregon. Native of eastern Asia. May–Nov.

3. MÍMULUS L. Sp. Pl. 634. 1753.

Erect or diffuse annual or perennial herbs, or in section *Diplacus* shrubs, with opposite entire to dentate or rarely lacinate leaves, and flowers axillary to foliose bracts of a simple and sometimes spike-like raceme. Bracteoles none. Sepals 5, united nearly throughout (less so in section *Mimuloides*), tube usually inflated and plicate-angled, the teeth equal or the uppermost longest. Corolla 2-lipped, yellow, purple, red, or violet, the throat open or its orifice closed by a palate. Filaments 4, didynamous, all antheriferous. Stigmas distinct and lamelliform, or else adhering by the margins into a funnelliform structure. Capsule cylindric, loculicidal, the septum unruptured to deeply splitting in dehiscence. Seeds wingless, yellowish, reticulate to nearly smooth. [Name Latin, diminutive of *mimus*, a mimic actor.]

About 150 species, of wide distribution, but most numerous in the western United States. Type species, *Mimulus ringens* L. of eastern North America.

Capsule symmetrical, soon dehiscent, its pedicel medianly attached.

Septum of capsule not or only distally splitting; pedicel longer than the calyx (or merely equaling it in *Monimanthus*).

Corolla deciduous, dropping before shriveling, the styles evident on the young capsules; pedicel longer than calyx.

Seeds cuneate to base, longitudinally lined; capsule 13–18 mm. long; corolla 40–50 mm. long, purple or red. I. ERYTHRANTHE.

Seeds rounded to both ends, smooth or finely striate; capsule, and usually also the corolla, smaller.

Calyx cylindric, moderately or not inflated, the lobes permanently straight or nearly so, and the throat not or only slightly plicate; corolla-throat open.

Capsule glabrous, wholly enclosed within calyx, the septum not or only slightly splitting distally; calyx-lobes shorter than calyx-tube, the uppermost less than twice length of others, the midrib of each sepal forming a ridge or low wing; corolla yellow or purple. II. PARADANTHUS.

Capsule glandular-puberulent, loosely surrounded by calyx, the septum splitting one-third to one-half its length; sepals unequal in size and unequally joined, the uppermost longest and the lowest united about one-half their length, all with faint unraised midribs; corolla yellow. III. MIMULOIDES.

Calyx sagittally compressed, strongly inflated, the uppermost lobe longest and projecting, the other pairs of lobes plicate, the lowest usually distally upcurving against the lateral pair; corolla yellow, its throat horizontally compressed and the orifice partially or wholly closed by the large hairy ventral ridges; septum of capsule not splitting. IV. SIMIOLUS.

Corolla semipersistent, purple, usually shriveling on the developing capsule; pedicels equaling or slightly longer than calyces. V. MONIMANTHE.

Septum of capsule splitting to base; corolla semipersistent, shriveling on the developing capsule; pedicels shorter than the calyces.

Calyx 20–40 mm. long, its tube proximally cylindric and distally more campanulate and ridge-angled; corolla 30–65 mm. long, yellow, orange, or red; stems woody, at least at base. VI. DIPLACUS.

Calyx 2–20 mm. long, its tube uniform throughout; corolla 4–45 mm. long, yellow or purple; plants annual.

Anthers all developed; calyx-tube plicate, the lobes equal or unequal; stems over 1 cm. tall. VII. EUNANUS.

Anthers of one pair smaller or lacking; calyx-tube plane, the lobes very unequal; stems not over 1 cm. tall. VIII. MICROPHYTON.

Capsule asymmetrical, more woody, tardily or not dehiscent; corolla semipersistent, shriveling on the developing capsule; pedicels shorter than the calyces. IX. OENOZ.

I. ERYTHRANTHE.

Corolla magenta-purple, its throat rounded and with yellow purple-spotted ridges, its lobes nearly equally spreading; anthers and stigma included. 1. *M. Lewisii*.

Corolla vermilion-scarlet, its throat narrow and internally dull yellow, the 2 upper lobes arched and united most of length, the 3 lower lobes widely deflexed-spreading; anthers and stigma exposed beneath upper corolla-lip. 2. *M. cardinalis*.

II. PARADANTHUS.

Plants rhizomatose, perennial; corolla yellow.

Stems elongated; leaf-blades pinnately veined; pedicels less than twice length of subtending leaves.

Corolla 30–40 mm. long, its throat widely campanulate; leaf-blades dentate. 3. *M. dentatus*.

Corolla smaller, its throat tubular-campanulate; leaf-blades denticulate to finely dentate.

Calyx-lobes 2–3 mm. long; corolla externally finely glandular-pubescent; stem erect to diffusely decumbent, from often extensive rhizomes.

Leaf-blades rounded to narrowed at base; corolla about 25 mm. long.

Plant with foliage finely pubescent to glabrous, the stem sometimes villous-pubescent; leaf-blades denticulate, all petioled. 4. *M. moniliformis*.

Plant more hairy; leaf-blades sharply toothed, at least the upper obscurely petioled or sessile.

Anthers glabrous; leaf-blades tending to ovate; plant erect or ascending. 5. *M. macranthus*.

Anthers finely pubescent; leaf-blades tending to oblong; plant lax, diffuse. 6. *M. inodorus*.

Leaf-blades truncate to rounded at base, all petioled; corolla about 20 mm. long. 7. *M. moschatius*.

Calyx-lobes 1–1.5 mm. long; corolla 15–18 mm. long, externally glabrous; stem procumbent, from slender rhizomes that form corm-like resting buds. 8. *M. jungermannioides*.

Stems short; leaf-blades palmately veined; pedicels more than twice length of subtending leaves and often exceeding that of the stem.

Leaf-blades linear-oblancheolate, the lower oblanceolate; corolla densely hirsute on ventral side of orifice; plants densely cespitose. 9. *M. linearifolius*.

Leaf-blades oblanceolate-oblong, nearly uniform throughout; corolla loosely hirsute on ventral side of orifice; plants lower, not truly cespitose. 10. *M. primuloides*.

Plants not rhizomatose; roots annual (or perhaps sometimes biennial).

Capsule included within calyx, which is 4–12 mm. long.

Anthers hairy; leaf-blades sessile or nearly so.

Stem and leaves glabrous or with glandless hairs; leaf-blades oval, 5-veined.

Corolla 8–9 mm. long, yellowish or purple. 11. *M. inconspicuus*.

Corolla 13–17 mm. long, purple.

Pedicels 5–12 mm. long; calyx glandular-puberulent; ventral ridges within corolla sharp, yellow, finely pubescent. 12. *M. Grayi*.

Pedicels 10–23 mm. long; calyx glabrous; ventral ridges within corolla less pronounced, the whole platform of the lower lip yellow and pilose.

13. *M. acutidens*.

- Stem and leaves glandular-pubescent or -puberulent; leaf-blades oblanceolate or narrowly so, 3-veined.
- Orifice of calyx eciliate, its teeth 1-2 mm. long.
- Calyx-teeth equal, subulate-tipped, its tube with thickened ribs.
- Corolla yellow, with upper lobes usually white; stem closely glandular-pubescent. 14. *M. bicolor*.
- Corolla purple, the lower lip less hairy; stem more loosely glandular-pubescent. 15. *M. Biolettii*.
- Calyx-teeth unequal, acute or acutish, the uppermost longest, calyx-tube with thin ribs. 16. *M. filicaulis*.
- Orifice of calyx ciliate, its teeth 0.5-1 mm. long.
- Corolla yellow or somewhat purplish, unmarked, the throat gradually expanding distally and the lobes rounded or truncate; pedicels two to two and a half times length of calyx, at maturity deflexed-spreading. 17. *M. discolor*.
- Corolla purple, with yellow ventral ridges, the lobes notched; pedicels two and a half to three and a half times length of calyx, more ascending-spreading. 18. *M. Palmeri*.
- Anthers glabrous.
- Calyx-lobes triangular-acute to -acuminate (or the ventral rounded in *M. alsinoides*).
- Leaf-blades petioled (or upper subsessile to sessile in *M. arenarius* and *M. breviflorus*); corolla yellow.
- Corolla at least twice as long as calyx; style over two-thirds the capsule-length.
- Lower lip slightly longer than but not much deflexed from upper lip of corolla; leaf-blades longer than their petioles.
- Stem and usually leaves strongly pubescent; leaf-blades acute, the cauline rounded to cordate at base; plant over 1 dm. tall.
- Throat of corolla cylindric, the ventral ridges narrow; pedicels not over one and one-half times the length of the bracts.
- Lobes of calyx triangular-subulate, one-fourth the length of tube; corolla 10-18 mm. long; stem villous with glandless hairs. 19. *M. subulatus*.
- Lobes of calyx triangular-acute to -acuminate, less than one-fourth the length of tube.
- Corolla 15-20 mm. long, its throat more than twice width of basal tube; pedicels 20-30 mm. long; stem villous with glandless hairs. 20. *M. Dudleyi*.
- Corolla less than 15 mm. long, its throat little wider than the basal tube; pedicels 10-20 mm. long; stem villous with glandless or largely gland-tipped hairs.
- Leaf-blades ovate, dentate or denticulate (except in dwarfs); corolla 5-12 mm. long. 21. *M. floribundus*.
- Leaf-blades lance-ovate, entire to slightly denticulate; corolla 10-13 mm. long; racemes narrower and more elongated. 22. *M. multiflorus*.
- Throat of corolla somewhat flattened, the ventral ridges so wide and prominent as to separate three deep channels that are richer yellow and coarsely spotted or blotched; pedicels one and one-half times to twice the length of the bracts. 23. *M. trisulcatus*.
- Stem and leaves glandular-puberulent or finely glandular-pubescent; cauline leaf-blades narrowed at base; plant 0.5-1.5 dm. tall.
- Leaf-blades acute or acutish, dentate or denticulate; stem finely pilose.
- Corolla 20-22 mm. long; calyx-lobes acuminate; leaf-blades coarsely toothed; stem glandular-pubescent. 24. *M. Whipplei*.
- Corolla 13-17 mm. long; calyx-lobes acute; leaf-blades finely dentate or denticulate; stem finely pilose. 25. *M. arenarius*.
- Leaf-blades obtuse or obtusish, denticulate to entire, the cauline well-petioled; corolla 9-14 mm. long; stem glandular-puberulent. 26. *M. Pulsiferae*.
- Lower lip deflexed from and longer than upper lip of corolla; leaf-blades ovate, palmately veined, shorter than or mostly about the length of their petioles.
- Calyx-teeth uniform, acute or acutish; corolla not blotched, the palate of the lower lip pubescent; leaf-blades acute to obtuse.
- Style glandular-pubescent; corolla 12-15 mm. long; calyx becoming 6-8 mm. long. 27. *M. washingtonensis*.
- Style glabrous; corolla 7-9 mm. long; calyx becoming 5-6 mm. long. 28. *M. patulus*.
- Calyx-teeth unlike, the upper 3 acute, the 2 lower longer and rounded; corolla 8-11 mm. long, the lower lip glabrous and with median brown blotch; leaf-blades obtuse or rounded. 29. *M. alsinoides*.
- Corolla less than twice as long as the calyx; style one-half to two-thirds as long as the capsule; leaf-blades elliptic-lanceolate, palmately veined, narrowed at base. 30. *M. breviflorus*.
- Leaf-blades (except lowermost in *M. latidens*) sessile by rounded bases; corolla purplish or white; root-system relatively strongly developed.
- Plant sparsely glandular-puberulent, with several to many slender stems 1.5-2.5 dm. tall; leaf-blades ovate, the upper pairs (bracts) remote and much smaller; calyx 10-12 mm. long, in fruit contracted distally. 31. *M. latidens*.
- Plant hirsute, the single stout stem 1.5-6 dm. tall; leaf-blades numerous, oblanceolate to oblong, the upper little smaller; calyx 9-10 mm. long, in fruit not contracted distally. 32. *M. Parishii*.
- Calyx-lobes rounded, either bluntly so or mucronate; leaf-blades sessile; plant glandular-puberulent.
- Stigmas not fringed; basal tube of corolla little or not surpassing the calyx.
- Pedicels 5-20 mm. long, less than twice length of bracts, eventually deflexed-spreading; anthers and stigmas included; leaf-blades oblong-lanceolate, obtuse, entire, 3-veined from narrow base.

Lobes of calyx ciliate, the calyx thrice as long as wide; stems ascending and growth relatively open.

Corolla yellow, 12–17 mm. long, its limb widely spreading; leaf-blades linear-lanceolate. 33. *M. montioides*.

Corolla yellow or purple, 8–9 mm. long, its limb little spreading; leaf-blades oblong-lanceolate. 34. *M. rubellus*.

Lobes of calyx eciliate, one and one-half to two and one-half times as long as wide; corolla yellow (rarely purple), 5–7 mm. long. 35. *M. Suksdorfii*.

Pedicels 15–27 mm. long, 3–5 times length of bracts, permanently ascending; anthers and stigmas exposed by reflexing of upper corolla-lobes; leaf-blades oblong, rounded, crenately dentate, hardly veined, rounded-clasping at base. 36. *M. androsaceus*.

Stigmas ciliate-fringed; basal tube of corolla surpassing calyx and evidently widened to throat. Corolla yellow with upper lip purple, or else yellow throughout, vertically displayed, the lower lip recurved-deflexed and hirsute; pedicels 1–2 times the length of the bracts. 37. *M. barbatus*.

Corolla purple, horizontally displayed, the lower lip decurved-spreading and finely puberulent to glabrous; pedicels more than twice the length of the bracts. Calyx-lobes ciliate; corolla-throat abruptly expanding, the lobes rounded and entire. 38. *M. gracilipes*.

Calyx-lobes eciliate or nearly so; corolla-throat gradually expanding, the lobes of the lower lip erose or notched. Ventral ridges of corolla scarcely evident, glabrous or nearly so; pedicels ascending, filiform, 15–50 mm. long; leaf-blades entire. 39. *M. purpureus*.

Ventral ridges of corolla well-developed, pubescent; pedicels spreading, less slender, 25–45 mm. long; leaf-blades obtusely denticulate to dentate-lobed. 40. *M. diffusus*.

Capsule longer than and projecting from calyx, which is only 2–3 mm. long. 41. *M. exiguus*.

III. MIMULOIDES.

Annual villous herb, with yellow corolla only 4–9 mm. long.

42. *M. pilosus*.

IV. SIMIOLUS.

Bracts narrowed to petioled or rarely sessile bases (if sessile, with blades linear to lanceolate).

Main leaf-blades oblong-lanceolate, dentate; corolla 15–20 mm. long, with small brown spots on lower lip; pedicels 20–30 mm. long. 43. *M. nudatus*.

Main leaf-blades dentate to mostly pinnatifid-lobed or even lacinate-pinnatifid; corolla 6–13 mm. long, usually with large brown distal blotch on lower lip; pedicels 15–45 mm. long. 44. *M. laciniatus*.

Bracts rounded to sessile or clasping bases (or, if petioled, with blades rounded or cordate at base).

Bracts distinct or only slightly connate; plants not glaucous.

Uppermost calyx-lobe linear-attenuate, the lowest pair of lobes upcurving 90° to close against it; corolla 10–30 mm. long, often with brown blotch on lower lip; leaf-blades rounded, sinuately and irregularly sharply dentate. 45. *M. nasutus*.

Uppermost calyx-lobe less sharp, acute to obtuse at tip, the lowest pair of lobes usually upcurved less than 90°; leaf-blades more regularly denticulate or dentate, or else sharply cut proximally.

Main leaf-blades acute or acutish or, if rounded, the flowers few; plants low, except in *M. decorus*.

Corolla 8–15 mm. long, less than twice length of calyx; calyx 7–10 mm. long, strongly purple-spotted, the lowest lobes becoming upcurved 90°; leaf-blades widely ovate, dentate. 46. *M. pardalis*.

Corolla 20–50 mm. long, more than twice length of calyx; calyx more than 10 mm. long, less strongly or not purple-spotted, the lowest lobes upcurved less than 90°; leaf-blades ovate to elliptic-ovate (or narrower), saliently dentate to entire.

Pedicels with glandless hairs only.

Corolla 30–50 mm. long, deep yellow, its orifice only partially closed by uparching palate; leaf-blades ovate; stems erect or somewhat decumbent.

Blades ample (3–6 cm. long), saliently dentate with 9–15 pairs of teeth; pedicels finely pubescent. 47. *M. decorus*.

Blades small (1.5–3 cm. long), dentate with about 6 pairs of low teeth; pedicels finely pubescent to glabrous. 48. *M. veronicifolius*.

Corolla 20–30 mm. long, light yellow, its orifice closed by uparching palate; leaf-blades elliptic-ovate or narrower, the larger 1–2 cm. long; stems ascending or diffusely spreading. 49. *M. minor*.

Pedicels with gland-tipped hairs or, if glabrous, the distal foliage and calyces somewhat glandular.

Leaf-blades 0.5–1.2 cm. long, denticulate to entire; throat of corolla triangular, its orifice only partially closed by the palate; plant relatively densely matted. 50. *M. caespitosus*.

Leaf-blades larger, sinuately and usually saliently dentate; throat of corolla more depressed, the orifice nearly or quite closed by the palate; plant usually more loosely matted. 51. *M. Tilingii*.

Main leaf-blades more rounded (acutish to usually widely rounded); racemes longer and usually indefinitely elongating.

Pedicels with glandless hairs only.

Leaf-blades not lobed at base nor bracts more hirsute than the similar foliage-leaves; plants less than 3 dm. tall, the slender stems often diffuse.

Corolla 15–22 mm. long, more than twice the length of calyx; stem erect or diffuse. 52. *M. microphyllus*.

Corolla smaller, less than twice the length of calyx.

Fruiting calyx about two-thirds as wide as long; leaf-blades 0.5–1.5 cm. long and wide, usually denticulate; stem erect. 61. *M. longulus*.

Fruiting calyx more than two-thirds as wide as long; leaf-blades 1.5–2 cm. long, orbicular or slightly wider than long, more sharply serrate; stem decumbent-ascending. 53. *M. clementinus*.

Leaf-blades, at least the lower, cut- or pinnatifid-lobed at base, the bracts usually more hirsute than the foliage-leaves; plants to 5 dm. tall or more, the stout stems erect or slightly decumbent at base.

Lateral and lower calyx-lobes acute, projecting, becoming upcurved toward or against the uppermost one.

Corolla 15–35 mm. long, two to three and a half times length of calyx, its orifice closed by the uparching palate; calyx 12–22 mm. long.
54. *M. lyratus*.

Corolla 5–10 mm. long, less than twice length of calyx, its orifice only partially closed by palate; calyx 8–14 mm. long.
55. *M. micranthus*.

Lateral and lower calyx-lobes truncate or mucronulate, at maturity only slightly upcurved against the stout and relatively blunt uppermost one; corolla two to two and a half times length of calyx, its orifice only partially closed by the palate.
56. *M. arvensis*.

Pedicels with gland-tipped hairs or glabrous (if the latter, with foliage or calyces somewhat glandular).

Corolla more than twice as long as calyx, relatively wide and strongly 2-lipped.

Fruiting calyx about two-thirds as wide as long; corolla 18–45 mm. long.

Leaf-blades from rounded to narrowed at base, rarely pinnatifid-lobed proximally; plant green in drying.
57. *M. guttatus*.

Leaf-blades rounded-cordate and usually with slender lobes proximally; plant darkening in drying.
58. *M. laxus*.

Fruiting calyx as wide as long; corolla 15–20 mm. long; plant very slender.
59. *M. platycalyx*.

Corolla less than or about twice as long as calyx, narrower and with less developed palate (sometimes varying to two and a half times calyx in *M. cordatus*).

Fruiting calyx 11–14 mm. long; corolla 12–15 mm. long; leaf-blades rounded to cordate at base.
60. *M. cordatus*.

Fruiting calyx 7–9 mm. long; corolla 5–10 mm. long; leaf-blades truncately rounded at base.
61. *M. longulus*.

Bracts widely connate; plants glaucous.

62. *M. glaucescens*.

V. MONIMANTHE.

Corolla 5–6 mm. long; plant glandular-pubescent.

63. *M. Breweri*.

VI. DIPLACUS.

Plant glandular-pubescent, the stems suffrutescent at base; corolla yellow, externally glandular-pubescent, its lobes all about equally joined; leaf-blades irregularly dentate.
64. *M. Clevelandii*.

Plant glutinous, the stems extensively woody; corolla externally glutinous, its upper lobes united one-third to one-half their length; leaf-blades dentate to entire.

Corolla yellow or orange, its throat campanulate, straight or slightly decurved; anthers, and usually also the stigmas, included.

Calyx loosely hirsute; corolla salmon-colored, its lobes truncate and broadly retuse; lower surface of leaf-blades with relatively long mostly unbranched hairs; pedicels 2–7 mm. long.
65. *M. longiflorus*.

Calyx glandular-puberulent or glabrate; lower surface of leaf-blades with branched hairs or glabrous; pedicels 6–17 (–25) mm. long.

Tube of calyx distally only slightly widened, the calyx 20–30 mm. long; corolla-throat narrowly campanulate, about as long as the narrow basal tube; plant more than 4 dm. tall.

Corolla orange, mostly 35–45 mm. long, its lobes rounded to retuse (or the upper slightly bilobed); leaf-blades finely serrate, stellate-pubescent beneath.
66. *M. aurantiacus*.

Corolla pale yellow, its lobes emarginate to bilobed; leaf-blades slightly serrulate to entire.

Leaf-blades acutish, linear-lanceolate, stellate-pubescent to glabrous beneath; corolla mostly 45–55 mm. long, its lobes notched less than one-fourth their depth.
67. *M. linearis*.

Leaf-blades obtuse to rounded, elliptic-oblong, glabrous beneath; corolla 50–65 mm. long, its lobes notched one-fourth to one-half their depth.
68. *M. bifidus*.

Tube of calyx distally inflated, the calyx becoming 35–40 mm. long; corolla-throat widely campanulate, about one-half the length of the narrow basal tube; plant 2–4 dm. tall.
69. *M. aridus*.

Corolla red, its lobes scarlet, its throat nearly cylindric and decurved; stigmas, and anthers of the longer filaments, exerted.

Leaf-blades linear-lanceolate, acute to acutish, stellate-pubescent to eventually glabrate beneath; corolla only slightly decurved.
70. *M. puniceus*.

Leaf-blades ovate-oblong, rounded at apex, glabrous beneath; corolla more slender and strongly decurved.
71. *M. Flemingii*.

VII. EUNANUS.

Corolla tubular-campanulate, the expanding throat clearly distinguishable from the narrower tube and hairy within ventrally, the upper lobes arched and united farther than the lower ones.

Stigmas, and usually at least the anthers of the longer filaments, exerted.

Calyx-lobes equal or somewhat unequal, the uppermost less than twice the length of the lowest pair; anthers usually hairy.

Leaf-blades and bracts elliptic, denticulate to dentate, somewhat pinnately veined; calyx-lobes acute to obtuse; corolla purple.
72. *M. clivicola*.

Leaf-blades and bracts entire, longitudinally veined; calyx-lobes with attenuate-subulate tips.

Blades elliptic or elliptic-ovate; corolla purple, the throat campanulately inflated, distally expanding.

Corolla 20–25 mm. long; calyx-lobes ovate-acuminate or -cuspidate; bracts acute to acuminate; stem 0.5–3 dm. tall, leafy.
73. *M. Cusickii*.

Corolla 10–13 mm. long; calyx-lobes uniformly tapering; bracts obtuse to broadly rounded; stem less than 0.5 dm. tall, bare below the single leaf-cluster.
74. *M. microphyton*.

Blades narrower, obtuse to acute; corolla-throat narrower.

Lobes of calyx obscurely glandular-pubescent, ovate to lanceolate or distally subulate-caudate; corolla purple; plants obscurely glandular, not strong-scented.

Corolla 13–20 mm. long, pilose only or mainly on lower side of orifice; anthers yellow or purplish, hardly exserted; leaf-blades elliptic-oblancoate, finely pubescent. 75. *M. nanus*.

Corolla 9–12 mm. long, pilose proximally on all lobes; anthers purple, exserted beneath upper lip of corolla; leaf-blades oblanceolate, glabrescent. 76. *M. Jepsonii*.

Lobes of calyx strongly glandular-pubescent, ovate-lanceolate to linear, acute to attenuate; plants evidently glandular-pubescent, often or usually strong-scented.

Corolla 10–15 mm. long, yellow (or rarely purple); calyx-tube not plicate-angled, the lobes equal or nearly so. 77. *M. mephiticus*.

Corolla 15–22 mm. long; calyx-tube plicately ridge- to wing-angled, the uppermost lobe longest.

Anthers at orifice of corolla-throat (or those of the longer filaments slightly exserted); corolla yellow or purple, in anthesis two and a half to three times the length of the calyx. 78. *M. densus*.

Anthers of both pairs usually somewhat exserted beneath upper lip of corolla; corolla usually purple and 3–4 times the length of calyx. 79. *M. coccineus*.

Calyx-lobes strongly unequal, the uppermost one about twice the length of the lowest pair; anthers glabrous; corolla purple. 80. *M. Johnstonii*.

Stigmas and anthers included in the corolla-throat, the former not or barely reaching the bases of the corolla-lobes.

Corolla purple (or also yellow in *M. Whitneyi*), not over 30 mm. long, the throat cylindric to narrowly campanulate (widest in *M. platylaemus*); uppermost lobe not over twice the length of the other calyx-lobes.

Corolla-lobes and stigmas equal or nearly so.

Calyx-tube, at maturity nearly plane, the ridges minutely pubescent and narrower than the scarious intervening tissue, the lobes lanceolate to nearly subulate; leaf-blades oblanceolate.

Corolla 9–17 mm. long, yellow with reddish markings to wholly purple. 81. *M. Whitneyi*.

Corolla 5–7 mm. long, purple (or with yellow lobes). 82. *M. leptaleus*.

Calyx-tube strongly plicate, the raised glandular-pubescent to hirsute ridges wider than the pale intervening tissue, the lobes ovate to cuspidate; leaf-blades oblong-lanceolate to narrowly elliptic.

Inner face of corolla-lobes glabrous; bracts and leaf-blades oblanceolate to oblong-lanceolate, obtuse to acute.

Anthers glabrous; corolla with widely spreading lobes, the diameter of the limb from two-thirds to nearly equaling the length of the tube and throat; bracts shorter than or equaling the fruiting calyces. 83. *M. Fremontii*.

Anthers hairy; corolla-lobes less abruptly spreading, the diameter of the limb one-half to two-thirds the length of the fruiting calyces.

Stem finely glandular-pubescent, and usually also villulose with glandless hairs proximally; calyx-lobes oblanceolate; calyx-lobes distally caudate-subulate; flowers mostly crowded in dense terminal racemes.

84. *M. constrictus*.

Stem glandular-hirsute nearly or quite throughout; bracts narrowly elliptic-lanceolate; calyx-lobes lanceolate, acute; flowers uniformly disposed, the upper not crowded.

Calyx 6–9 mm. long; corolla 13–20 mm. long; leaf-blades narrowly oblong-lanceolate, mostly slightly petioled.

85. *M. Layneae*.

Calyx 9–12 mm. long; corolla 20–25 mm. long; leaf-blades nearly elliptic-lanceolate, sessile. 86. *M. viscidus*.

Inner face of corolla-lobes pilose; bracts and leaf-blades elliptic-lanceolate to nearly elliptic.

Lowest pair over one-half the length of uppermost calyx-lobe; corolla 20–25 mm. long, the limb abruptly widely spreading (smaller and with less spreading limb in *M. Bigelovii panamintensis*); bracts and leaves acuminate to cuspidate, finely glandular-pubescent. 87. *M. Bigelovii*.

Lowest pair less than or about one-half the length of uppermost calyx-lobe; corolla 15–20 mm. long, the limb less strongly spreading; bracts and leaves obtusely rounded to acute, villose-pubescent with some hairs gland-tipped.

80. *M. Johnstonii*.

Corolla-lobes unequal, the lower obviously longer (or hardly so in *M. Rattanii* and *M. Bolanderi*); stigmas unequal, the lower longer and decurved.

Plicae of calyx thin, not strongly contrasting with intervening pale surface, the lobes low, acute to acutish or the lateral rounded; corolla 15–20 mm. long.

88. *M. Torreya*.

Plicae of calyx thick, dark green and more conspicuously contrasting with intervening pale surface.

Lower stigma rounded, wider than long; bracts (except lowermost) shorter than calyces; inflorescence strongly secund.

Calyx-lobes acute-acuminate; stem with only spreading hairs.

Corolla 10–13 mm. long, pubescent within on lower side; hairs of stem all conspicuously gland-tipped. 89. *M. brachiatus*.

Corolla 15–17 mm. long, glabrous within; hairs of stem mostly glandless, but some obscurely gland-tipped. 90. *M. subsecundus*.

Calyx-lobes truncately rounded to acutish; corolla 8–10 mm. long, glabrous within; hairs of stem partly reflexed and glandless and partly longer, spreading and conspicuously gland-tipped. 91. *M. Rattanii*.

Lower stigma elongated, many times exceeding the upper one; corolla glandular-puberulent

- within on all sides; bracts (except uppermost) longer than calyces and mostly dentate distally; inflorescence slightly or not secund.
- Throat of corolla nearly cylindric; fruiting calyx 12–17 mm. long, its uppermost lobe usually 3–5 mm. long. 92. *M. Bolanderi*.
- Throat of corolla nearly campanulate; fruiting calyx 20–25 mm. long, its uppermost lobe 6–7 mm. long. 93. *M. platylaemus*.
- Corolla yellow, 25–45 mm. long, its throat widely campanulate; uppermost calyx-lobe 5–10 mm. long, 2–3 times length of other lobes. 94. *M. brevipes*.
- Corolla salverform, purple, its pale limb reticulate-veined, its throat not distinguishable from the wide cylindric tube, both externally glandular-puberulent. 95. *M. mohavensis*.

VIII. MICROPHYTON.

Plant minute; corolla yellow or purplish.

96. *M. pygmaeus*.

IX. OENOE.

- Corolla (if opening) salverform, purple, its pale limb reticulate-veined, its throat not distinguishable from the wide cylindric tube, both externally glabrous.
- Capsule straight, about 4 times as long as wide, dehiscent through septum distally; corolla 10–12 mm. long, chasmogamous; calyx-lobes acute; bracts narrowly elliptic; plant 1.5 dm. tall. 97. *M. pictus*.
- Capsule decurved, less than twice as long as wide, tardily or not dehiscent; corolla rudimentary, cleistogamous; calyx-lobes obtuse; bracts oblanceolate; plant less than 1 cm. tall. 98. *M. cleistogamus*.
- Corolla tubular-campanulate, its expanding throat clearly distinguishable from the narrow tube, externally finely pubescent or glabrous; capsule tardily or not dehiscent.
- Stigmas equal or nearly so, rounded, wider than long; lower equaling or exceeding upper lobes of corolla; leaf-blades linear to oblanceolate.
- Anthers glabrous; corolla-tube equaling calyx and about as long as the yellow slightly 2-ridged throat, the widely spreading lobes mallow-purple; calyx-lobes acute to attenuate-tipped; pedicels strongly decurved; lower leaf-blades petioled. 99. *M. rupicola*.
- Anthers hairy; corolla-tube much exceeding calyx and longer than the strongly 2-ridged and dorsally dark purple throat, the bilabially projecting-spreading lobes purple; calyx-lobes obtuse or obtusish; pedicels straight; leaf-blades all sessile or nearly so.
- Tube of corolla not over twice as long as calyx, and about twice as long as throat; capsule 6–7 mm. long; leaf-blades oblanceolate. 100. *M. tricolor*.
- Tube of corolla more than twice as long as calyx, and more than thrice length of throat; capsule 3–4 mm. long; leaf-blades linear to narrowly oblanceolate.
- Lower lip of corolla yellow with many fine purple spots; corolla-tube externally minutely pilose, 3–4 times length of calyx; calyx-lobes very unequal; plants usually caulescent. 101. *M. pulchellus*.
- Lower lip of corolla purple, medianly pale and with large purple spots; corolla-tube externally glabrous, 3–6 times length of calyx; calyx-lobes nearly equal; plants nearly acaulescent. 102. *M. angustatus*.
- Stigmas unequal, the lower longer; lower shorter than upper lip of the purple corolla.
- Capsule decurved, semiterete, not widened at base; plants glandular-pubescent.
- Lower one-half to three-fourths the length of upper lip of corolla, both lips purple, the upper darker; corolla 30–45 mm. long, its tube at least one and a half times length of calyx. 103. *M. Kelloggi*.
- Lower less than one-fifth the length of upper lip of corolla, the lower lip purple and the upper white; corolla 20–25 mm. long, its tube about equaling calyx. 104. *M. Traskiae*.
- Capsule straight or slightly decurved, somewhat flattened, widest at base; plants pubescent to hirsute.
- Lower lip of corolla at least one-fourth length of upper, the corolla less than 30 mm. long and its throat narrowly campanulate; calyx-lobes only slightly more hairy than its tube.
- Tube of corolla one and a half to two times length of calyx, the corolla 13–25 mm. long, with throat not darker than lobes; leaf-blades narrowly elliptic-obovate, their proximal margins and the calyces hirsute with glandless hairs. 105. *M. Congdonii*.
- Tube of corolla about equaling calyx, the corolla about 15 mm. long, with throat darker than lobes; leaf-blades elliptic-ovate; plant densely glandular-pubescent, the calyces glandular-pilose. 106. *M. Brandegei*.
- Lower lip of corolla rudimentary or lacking, the corolla 30–40 mm. long and its throat inflated-campanulate, darker than the corolla-lobes; calyx glandular-pubescent, but with the lobes densely ciliate with glandless hairs. 107. *M. Douglasii*.

1. *Mimulus Lewisii* Pursh. Lewis' or Great Purple Monkey-flower. Fig. 4521.

Mimulus Lewisii Pursh, Fl. Amer. Sept. 427. 1814.

Erect glandular-pubescent perennial herb, the stem 3–9 dm. tall. Leaf-blades oblong-elliptic, sinuately denticulate, longitudinally 3–5 veined, narrowed to rounded-clasping bases or the lower with ill-defined petioles, the larger blades 3–7 cm. long; pedicels 30–70 or even 100 mm. long; calyx 20–30 mm. long, angulate-ribbed, lobes nearly even, triangular-aristate, 4–6 mm. long; corolla 30–50 mm. long, the lobes magenta, little differentiated, the campanulate throat ventrally with 2 yellow hairy ridges and purple-red spots; anthers ciliate; stigmas fimbriolate; capsule 13–14 mm. long, dehiscent through apex of septum.

Streamsides and wet banks, Canadian Zone to Arctic-Alpine Zone; southeastern Alaska to the southern Sierra Nevada of California, eastward to Montana and Colorado. Type locality: near the Lolo Pass in northern Idaho. June–Aug.

2. *Mimulus cardinalis* Dougl. Scarlet Monkey-flower. Fig. 4522.

Mimulus cardinalis Dougl. ex Benth. Scroph. Indicae 28. 1835.

Erect perennial herb, the stem 4–12 dm. tall, hirsute but scarcely glandular. Leaf-blades oval to oblong-elliptic, sinuately denticulate, longitudinally 3–5-veined, glandular-pubescent, at least the upper with rounded-clasping bases, the larger blades 7–11 cm. long; pedicels 50–80 mm.

long; calyx 25–30 mm. long, angulate-winged, lobes nearly even, acute, 3–5 mm. long; corolla 45–50 mm. long, lobes scarlet, the narrow throat yellowish, ventrally with 2 yellow hairy ridges, strongly 2-lipped, the upper lip arched-ascending, the lower lobes decurved-reflexed; anthers ciliate, exposed beneath upper lip; stigmas fimbriolate; capsules 16–18 mm. long, dehiscing through apex of septum.

Along stream courses, especially in canyons and on cliffs, Lower Sonoran Zone to Transition Zone; from southern Oregon south to northern Lower California, extending east of the southern Sierra Nevada to Inyo County, California, and Mineral County, Nevada. Type locality: California. April–Oct.

3. *Mimulus dentatus* Nutt. Tooth-leaved Monkey-flower. Fig. 4523.

Mimulus dentatus Nutt. ex Benth. in A. DC. Prod. 10: 372. 1846.

Perennial pilose or glabrescent herb, rhizomatose, the stems 2–4 dm. tall, erect or ascending. Leaf-blades lance- to ovate-elliptic, coarsely dentate, pinnately veined, rounded or cuneately narrowed to short petioles or the upper clasping, the largest blades 3–7.5 cm. long; pedicels becoming 20–30 mm. long; calyx 15 mm. long, ridge-angled, lobes 4–5 mm. long, attenuate, the upper slightly longer; corolla 30–40 mm. long, yellow, externally often brownish, the throat campanulate, ventrally flattened and 2-ridged, pubescent and brown-mottled, the lobes all spreading, the lower slightly the longer; anthers villose-hirsute; capsule 8 mm. long, the septum not splitting.

Moist coniferous forest, Transition Zone; Pacific forests from western Washington south to northwestern California. Type locality: Columbia River. May–Aug.

4. *Mimulus moniliformis* Greene. Smooth Musk Flower. Fig. 4524.

Mimulus moniliformis Greene, Bull. Calif. Acad. 1(1): 10. 1884.

Mimulus Leibergii Grant, Ann. Mo. Bot. Gard. 11: 231. 1925.

Perennial finely pubescent to glabrous herb, rhizomatose, the stems ascending or erect, 1–3 dm. tall, much-branched. Leaf-blades narrowly elliptic to oval, sinuately denticulate, pinnately veined, rounded or narrowed to short petioles, the largest blades 2–4 cm. long; pedicels becoming 25–40 mm. long; calyx 11–12 mm. long, ridge- to wing-angled, lobes 2–3 mm. long, lanceolate, equal or nearly so; corolla 24–27 mm. long, yellow, the throat tubular-cylindric, ventrally 2-ridged and densely pubescent, with elongated brown spots and with many dark brown lines, the lobes all spreading and nearly alike; anthers glabrous; capsule 7 mm. long, not dehiscing through septum.

Moist or often desiccated soil, Canadian and Hudsonian Zones; mountains of Humboldt County and in the Sierra Nevada south to Alpine County, California. Type locality: "higher Sierras" of California. June–Sept.

5. *Mimulus macranthus* Pennell. Long-tubed Musk Flower. Fig. 4525.

Mimulus moschatus longiflorus A. Gray, Syn. Fl. N. Amer. 2¹: 278. 1878.

Mimulus macranthus Pennell, Proc. Acad. Phila. 99: 160. 1947.

Perennial glandular-villose herb, rhizomatose, the stems erect or ascending, 1–3 dm. tall. Leaf-blades oblong-ovate to oval, saliently denticulate to dentate, pinnately veined, the largest blades 2–4 cm. long; pedicels becoming 15–35 mm. long; calyx 10–12 mm. long, ridge- to wing-angled, its lobes 2–3 mm. long, lanceolate, often slightly unequal; corolla 22–26 mm. long, yellow, the throat tubular-cylindric, ventrally 2-ridged and densely pubescent, with brown spots and on all sides with fine blackish lines, the lobes all spreading and nearly alike; anthers glabrous; capsule 7–8 mm. long, not dehiscing through septum.

Moist sandy soil, along streams and in coniferous forest, Transition and Canadian Zones; from Siskiyou County south through the Sierra Nevada, and in the San Bernardino and San Gabriel Mountains, California; also east of Lake Tahoe in Nevada. Type locality: Hatchet Mountain, Shasta County, California. May–Aug.

6. *Mimulus inodorus* Greene. Sessile-leaved Musk Flower. Fig. 4526.

Mimulus inodorus Greene, Bull. Calif. Acad. 1: 119. 1885.

Mimulus moschatus var. *sessilifolius* A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 447. 1886.

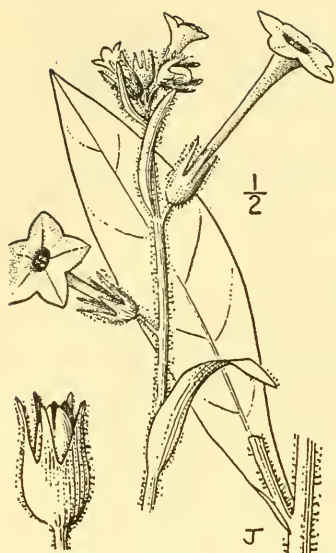
Perennial glandular-pubescent to -villose herb, rhizomatose, the stems laxly ascending or sprawling, 2–8 dm. long. Leaf-blades oblong-lanceolate, saliently denticulate to dentate, pinnately veined, rounded to sessile, or the lower to slightly petioled bases, the largest blades 3–7 cm. long; pedicels becoming 15–50 mm. long; calyx 10–12 mm. long, wing- and somewhat plicate-angled, its lobes 2–3 mm. long, lanceolate, often slightly unequal; corolla 20–25 mm. long, yellow, the throat narrowly campanulate, ventrally 2-ridged and densely pubescent, on all sides with fine blackish lines, the lobes all spreading and nearly alike; anthers finely pubescent; capsule 7 mm. long, not dehiscing through septum.

Wet sandy soil, Upper Sonoran Zone to Canadian Zone; Pacific forests from western Washington south to northern California. Type locality, California. June–Aug.

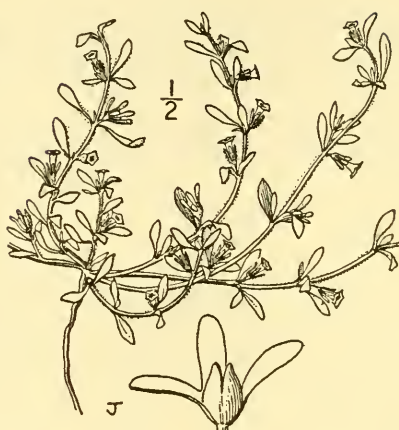
7. *Mimulus moschatus* Dougl. Musk Flower. Fig. 4527.

Mimulus moschatus Dougl. ex Lindl. Bot. Reg. 13: pl. 1118. 1828.

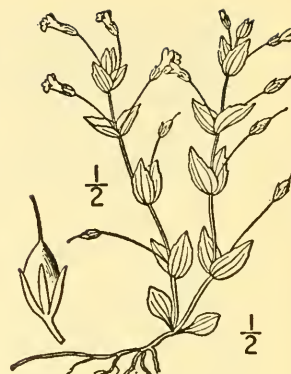
Perennial glandular-pilose to -villose herb, rhizomatose, the stems decumbent or diffuse, 1–4 dm. long. Leaf-blades oblong-ovate, sinuately dentate, pinnately veined, truncate or rounded to short petioles, the largest blades 2–5 cm. long; pedicels becoming 10–40 mm. long; calyx 8–11 mm. long, wing- and somewhat plicate-angled, its lobes 2–3 mm. long, lanceolate, often somewhat unequal; corolla 18–25 mm. long, yellow, the throat tubular-cylindric, ventrally 2-ridged and



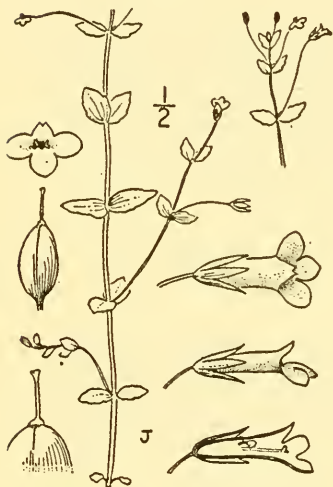
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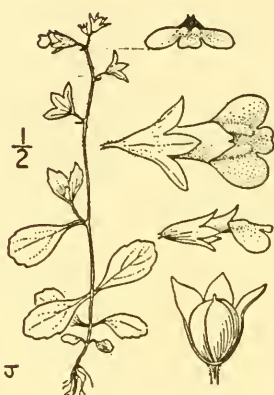
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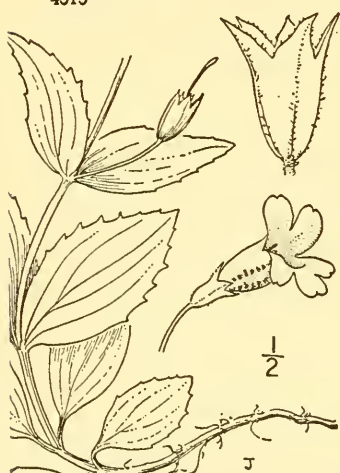
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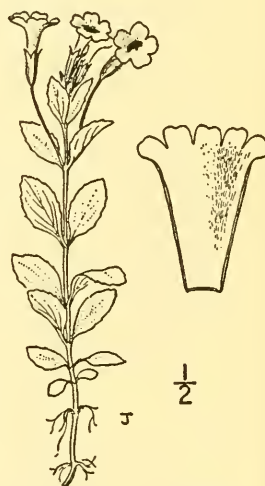
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4516. *Nicotiana Bigelovii*
 4517. *Petunia parviflora*
 4518. *Lindernia dubia*

4519. *Lindernia anagallidea*
 4520. *Mazus japonicus*
 4521. *Mimulus Lewisii*

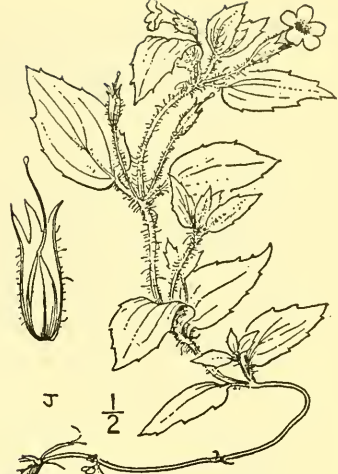
4522. *Mimulus cardinalis*
 4523. *Mimulus dentatus*
 4524. *Mimulus moniliformis*



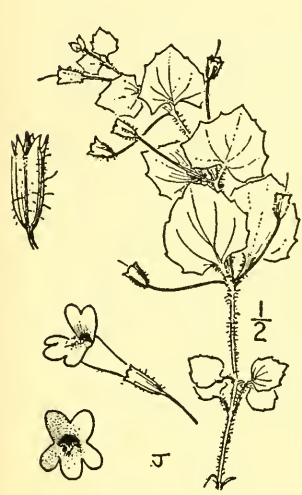
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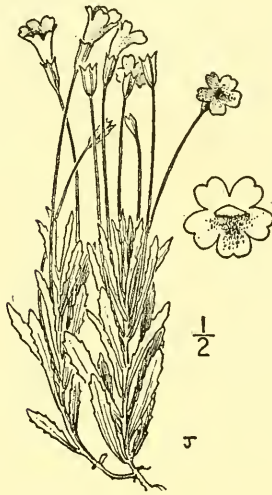
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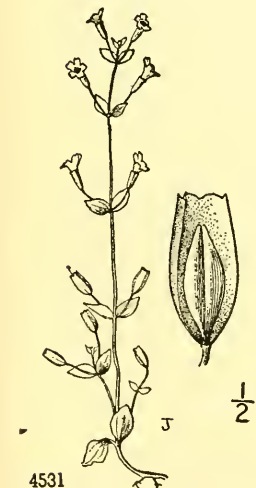
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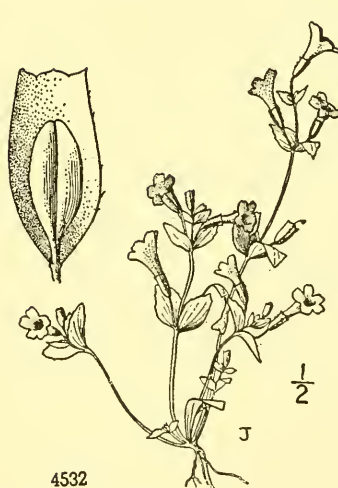
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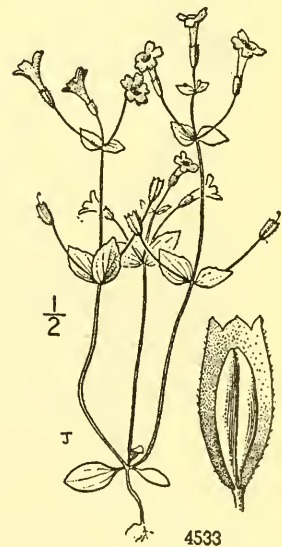
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4525. *Mimulus macranthus*
 4526. *Mimulus inodorus*
 4527. *Mimulus moschatus*

4528. *Mimulus jungermannioides*
 4529. *Mimulus linearifolius*
 4530. *Mimulus primuloides*

4531. *Mimulus inconspicuus*
 4532. *Mimulus Grayi*
 4533. *Mimulus acutidens*

pilose, with fine brown spots and blackish lines, the lobes all spreading and nearly alike; anthers obscurely or not pubescent; capsule 6 mm. long, not dehiscing through septum.

Wet soil, bogs and along streams, Transition and Canadian Zones; British Columbia and Montana, south to San Jacinto Mountains of southern California, Utah, and Colorado; also in northeastern North America. Type locality: Fort Vancouver, Washington. June-Aug.

8. *Mimulus jungermannioides* Suksd. Hepatic Monkey-flower. Fig. 4528.

Mimulus jungermannioides Suksd. Deutsch. Bot. Monatss. 18: 154. 1900.

Perennial loosely villose herb, rhizomatose, the stems extensively procumbent, 1-3 dm. long. Leaf-blades ovate, sinuately dentate, pinnately veined, rounded to petioles one-half to nearly as long as the blades, the largest blades 0.7-1.7 cm. long; pedicels 15-25 mm. long; calyx 6-8 mm. long, wing- and somewhat plicate-angled, its lobes 1-1.5 mm. long, acute to rounded-acuminate, equal or nearly so; corolla 16-18 mm. long, yellow, the throat ventrally 2-ridged, spotted and densely hairy, its orifice open and the lobes rounded; anthers glabrous; capsule not seen.

Rock crevices, Upper Sonoran and Transition Zones; along Columbia River above the Narrows, Washington and Oregon. Type locality: Bingen, Washington. July-Nov.

9. *Mimulus linearifolius* (Grant) Pennell. Linear-leaved Monkey-flower. Fig. 4529.

Mimulus primuloides var. *linearifolius* Grant, Ann. Mo. Bot. Gard. 11: 246. 1925.

Perennial glabrescent densely caespitose herb, rhizomatose, the stems erect or ascending, 0.6-1.2 dm. tall. Leaf-blades linear-oblancoate, distally dentate, obscurely longitudinally 3-veined, long-cuneate to slightly clasping bases, the largest blades 2-4 cm. long; pedicels erect, 65-85 mm. long; calyx 7-11 mm. long, wing- and somewhat plicate-angled, its lobes 1-2 mm. long, acuminate, ciliate; corolla 18-22 mm. long, yellow, the throat narrowly campanulate, its 2 ventral ridges densely hairy, its palate deeper yellow, with diffused blackish maroon spots and with larger similar spot median to each corolla-lobe, the orifice open and the lobes all spreading and rounded; anthers ciliate; capsule 6-7 mm. long, dehiscing through apex of septum.

Moist soil, meadows and rocky banks, Transition Zone to Hudsonian Zone; Mount Eddy, northern California. Type locality: Mount Eddy. July-Aug.

10. *Mimulus primuloides* Benth. Primrose Monkey-flower. Fig. 4530.

Mimulus primuloides Benth. Scroph. Indicae 29. 1835.

Perennial short-stemmed or rosulate herb, rhizomatose, the villose stems erect or ascending, up to 5 cm. long, often stoloniferous. Leaf-blades oblanceolate to elliptic-obovate, dentate distally to denticulate or entire, longitudinally 3-veined, glabrous or villose above, cuneate to sessile bases, the largest blades 0.7-4.5 cm. long; pedicels erect, 30-130 mm. long; calyx 6-7 mm. long, slightly ridged, its lobes 1-2 mm. long, mucronulate, ciliate; corolla 15-20 mm. long, yellow, the throat narrowly campanulate, the palate deeper yellow and densely hairy, the ventral side of throat with many small brown spots and sometimes with larger brown spot, the orifice open and the lobes all spreading and notched; anthers ciliate; capsule 6-7 mm. long, dehiscing through apex of septum.

Moist soil, especially in moss or short grass, Transition Zone to Hudsonian Zone; Washington south to San Jacinto Mountains of southern California, east to Idaho, Utah, and Arizona. Type locality: Columbia River. June-Aug.

Mimulus primuloides var. *pilosellus* (Greene) Smiley, Univ. Calif. Pub. Bot. 9: 332. 1921. (*Mimulus pilosellus* Greene, Erythra 4: 22. 1896; *M. nevadensis* Gandoger, Bull. Soc. Bot. Fr. 66: 218 1919; *M. primuloides minimus* M. E. Peck, Proc. Biol. Soc. Wash. 47: 187. 1934.) Smaller, the corolla usually 5-10 mm. long, its lobes not or only moderately notched; pedicels usually 10-50 mm. long, and leaf-blades villose above. With the species, especially in Oregon, and occasional in California south to the San Bernardino Mountains. Type locality: not given.

11. *Mimulus inconspicuus* A. Gray. Inconspicuous Monkey-flower. Fig. 4531.

Mimulus inconspicuus A. Gray, Pacif. R. Rep. 4: 120. 1857.

Annual glabrous herb, forming first a rosette of petioled ovate undulate-margined leaves, the stems erect or decumbent, 0.5-1.5 dm. tall, with several pairs of sessile leaves about 1 cm. long, 5-6 mm. wide. Pedicels 10-12 mm. long; calyx 8-9 mm. long, ridge-angled, its lobes 0.5 mm. long, apiculate, slightly ciliolate; corolla 8-9 mm. long, purplish, less than twice calyx in anthesis, the throat cylindric, its 2 ventral ridges low and minutely pubescent, its orifice open and the short purple lobes scarcely spreading; anthers villose; capsule 6-7 mm. long, dehiscing through septum-apex.

Moist soil, Transition Zones; foothills of mountains, Amador County south to Los Angeles County, California. Type locality: Los Angeles, California. May.

12. *Mimulus Grayi* Grant. Mariposa Monkey-flower. Fig. 4532.

Mimulus Grayi Grant, Ann. Mo. Bot. Gard. 11: 203. 1925.

Annual glabrous herb, the stems erect, 0.5-2 dm. tall, proximally bare except for a pair of small slightly petioled leaves, distally with sessile, oval, 3-5-veined undulately denticulate slightly petioled leaf-blades. Pedicels 5-10 mm. long; calyx 8-9 mm. long, wing-angled, its lobes 0.5 mm. long, apiculate, not ciliate; corolla 13-16 mm. long, purple, the throat cylindric, its 2 ventral

ridges yellow and finely pubescent, its orifice open and the spreading lobes notched; anthers ciliate; capsule 6 mm. long, dehiscing through septum-apex.

Moist sandy soil, openings in coniferous forest, Transition Zones; lower slopes of Sierra Nevada, Mariposa County to Tulare County, California. Type locality: Mariposa, California. May-July.

13. *Mimulus acutidens* Greene. King's River Monkey-flower. Fig. 4533.

Mimulus acutidens Greene, Bull. Calif. Acad. 1: 117. 1885.

Annual glabrous herb, the stems erect or decumbent, 0.5–2 dm. tall. Leaf-blades broadly ovate, denticulate, 3–5 nerved, sessile, the largest 1–2 cm. long, the lowermost smaller and slightly petioled; pedicels becoming 10–23 mm. long; calyx 7–9 mm. long, plicate-angled, its lobes 0.5–0.7 mm. long, subulate-tipped, ciliate; corolla 13–17 mm. long, purple, the throat cylindric, its 2 ventral ridges yellow and waxy-puberulent, its orifice open and the spreading lobes notched; anthers ciliate; capsule 6 mm. long, dehiscing slightly through septum-apex.

Moist soil, Transition Zones; lower Sierra Nevada in Fresno and Tulare Counties, California. Type locality: Kings River Mountains, California. April-July.

14. *Mimulus bicolor* Hartw. Yellow-and-white Monkey-flower. Fig. 4534.

Mimulus bicolor Hartw. ex. Benth. Pl. Hartw. 328. 1849.

Mimulus Prattenii Durand, Journ. Acad. Phila. II. 3: 98. 1855.

Annual glandular-pubescent herb, the stems ascending or erect, 1–2.5 dm. tall. Leaf-blades oblanceolate, denticulate to dentate, attenuate to sessile, or the lowest to semipetiolate bases, the mid-cauline blades 1.5–3 cm. long, the basal leaves often larger and wider, though at times small and ephemeral; pedicels becoming 10–25 mm. long; calyx 9–10 mm. long, strongly ridge-to wing-angled, corky-ribbed, its lobes 1–2 mm. long, lance-subulate, ciliate; corolla 15–20 mm. long, yellow, the throat campanulate, its 2 ventral ridges sharp, with brown spots and densely set clavate hairs, its orifice open and the lobes spreading, the upcurved upper ones usually white; anthers ciliate; capsule 5 mm. long, not dehiscing through septum-apex.

Moist banks and open places, Transition Zones; lower slopes of Sierra Nevada from Shasta County to Tulare County, California. Type locality: "Sacramento Mountains," California. April-June.

15. *Mimulus Biolettii* Eastw. Hetch-Hetchy Monkey-flower. Fig. 4535.

Mimulus Biolettii Eastw. Proc. Calif. Acad. III. 2: 290. 1902.

Annual glandular-pubescent herb, the stems erect or ascending, 1–1.5 dm. tall. Leaf-blades oblanceolate, entire or slightly denticulate, attenuate to sessile, or the lowest to semipetiolate bases, the mid-cauline blades 1.5–2 cm. long, the basal leaves little or not larger; pedicels becoming 10–25 mm. long; calyx 9–10 mm. long, strongly wing-angled, corky-ribbed, its lobes 1–2 mm. long, lance-subulate, ciliate; corolla 15–20 mm. long, rose-purple, the throat campanulate, dark purple, its 2 ventral ridges yellow and finely pubescent, distally confluent in yellow area, its orifice open and the lobes all spreading and notched; anthers finely pubescent; capsule 6 mm. long, not dehiscing through septum-apex.

Wet granitic sand, Transition Zones; lower slopes of Sierra Nevada in Tuolumne and Mariposa Counties, California. Type locality: Hetch-Hetchy Valley, Tuolumne County, California. May-July.

16. *Mimulus filicaulis* S. Wats. Slender-stemmed Monkey-flower. Fig. 4536.

Mimulus filicaulis S. Wats. Proc. Amer. Acad. 26: 125. 1891.

Annual sparsely glandular-pubescent herb, the stem erect, 0.9 dm. tall. Leaf-blades shorter than internodes, elliptic to narrowly oblong, 1–1.5 cm. long, cuneate to sessile bases; pedicels 10–15 mm. long; calyx in anthesis 5 mm. long, plicate-angled, its lobes acute or acutish, about 1 mm. long, the uppermost nearly 2 mm. long; corolla 15–17 mm. long, purple, the throat campanulate, ventrally pubescent, its 2 ventral ridges yellow and with deep purple spots, its orifice open and the lobes spreading; anthers finely hairy; capsule not seen.

Moist soil, Canadian or Hudsonian Zone; upper slopes of Sierra Nevada in Mariposa County, California. Type locality: Snow Creek, Mariposa County. May-June.

17. *Mimulus discolor* Grant. Parti-colored Monkey-flower. Fig. 4537.

Mimulus discolor Grant, Ann. Mo. Bot. Gard. 11: 257. 1925.

Annual finely glandular-pubescent herb, the stems erect, 0.3–0.9 dm. tall. Leaf-blades narrowly oblanceolate to nearly linear, entire, sessile, the larger blades 1–2 cm. long; pedicels becoming 8–20 mm. long; calyx 6–8 mm. long, slightly ridge-angled, its lobes 1–1.5 mm. long, ovate, ciliate; corolla 13–15 mm. long, yellow, the throat narrowly campanulate, ventrally and over lower lip finely pubescent, its 2 ventral ridges with denser clavate hairs, its ventral side with maroon dots or patches, its orifice open, the ascending upper lobes pale yellow or whitish; anthers obscurely pubescent; capsule 5–7 mm. long, dehiscing through septum-apex.

Moist sandy or gravelly soil, Transition and Canadian Zones; lower slopes of Sierra Nevada and mountains southward, Tuolumne County to Kern County, California. Type locality: Piute ("Pah Ute") Peak, southeastern California. June-July.

18. *Mimulus Palmeri* A. Gray. Palmer's Monkey-flower. Fig. 4538.

Mimulus Palmeri A. Gray, Proc. Amer. Acad. 12: 82. 1876.

Annual finely glandular-pubescent herb, the stems erect, 0.5–1.5 dm. tall. Leaf-blades narrowly elliptic- or oblanceolate-oblong, denticulate to entire, sessile (except the diminutive

lowermost ones), the larger blades 0.5–2 cm. long; pedicels becoming 10–25 mm. long; calyx 6–8 mm. long, ridge- to wing-angled, its lobes 0.5–1 mm. long, acute or mucronate, ciliate; corolla 15–20 mm. long, purple, the throat cylindric-campanulate, darker purple to the open orifice, pubescent with clavate hairs on the 2 yellow ventral ridges, medianly pale, the spreading lobes emarginate; anthers finely pubescent; capsule 5 mm. long, dehiscing slightly through septum-apex.

Open banks in forest, Transition Zones; lower slopes of southern Sierra Nevada to San Bernardino and San Gabriel Mountains, Fresno County to San Bernardino and Los Angeles Counties, California. Type locality: Mojave River, southern California. April–June.

19. *Mimulus subulatus* (Grant) Pennell. Awl-toothed Monkey-flower. Fig. 4539.

Mimulus floribundus var. *subulatus* Grant, Ann. Mo. Bot. Gard. 11: 222. 1925.

Mimulus subulatus Pennell, Proc. Acad. Phila. 99: 162. 1947.

Annual villosely glandular-pubescent herb, the stems diffusely much-branched (sometimes diminutive), prostrate or ascending, usually 3–6 dm. long. Leaf-blades elliptic-ovate, dentate, pinnately veined, rounded to petioles one-sixth to one-half the length of blades, the larger blades 1–4 cm. long; pedicels becoming 15–22 mm. long; calyx 6–8 mm. long, wing-angled, its lobes 2–3 mm. long, ovate-caudate to subulate tips; corolla 10–18 mm. long, yellow, the throat narrowly campanulate, ventrally deeper yellow and with 2 ridges pubescent with clavate hairs, the orifice open and the spreading lobes rounded or slightly erose; anthers glabrous; capsule 4–5 mm. long, not dehiscing through septum-apex.

Moist places, gravelly soil and rock crevices, Upper Sonoran and Transition Zones; lower slopes of southern Sierra Nevada from Tuolumne County to Tulare County, central California. Type locality: Tuolumne County, California. May–July.

20. *Mimulus Dudleyi* Grant. Dudley's Monkey-flower. Fig. 4540.

Mimulus Dudleyi Grant, Ann. Mo. Bot. Gard. 11: 235. 1925.

Annual herb, the villose stems decumbent or ascending, 1–1.5 dm. long. Leaf-blades ovate, sharply dentate, palmately veined, truncate or cordate to petioles one-half to two-thirds the length of blades, the larger blades 1.5–3.5 cm. long; pedicels becoming at least 20–30 mm. long; calyx 6–8 mm. long, wing-angled, its lobes 2 mm. long, acute, ciliate; corolla 15–20 mm. long, yellow, the throat narrowly campanulate, ventrally deeper yellow and with 2 ridges pubescent with knobbed hairs, the open orifice and bases of the spreading rounded lobes sparsely pilose; anthers glabrous; capsule 6–7 mm. long, not dehiscing through septum-apex.

Crevices of granitic rock, Upper Sonoran Zone; base of Sierra Nevada from Madera County to Tulare County, central California. Type locality: Tule River, Tulare County. March–April.

21. *Mimulus floribundus* Dougl. Floriferous Monkey-flower. Fig. 4541.

Mimulus floribundus Dougl. ex. Lindl. Bot. Reg. 13: pl. 1125. 1828.

Mimulus peduncularis Dougl. ex. Benth. Scroph. Indicae 29. 1835.

Mimulus geniculatus Greene, Bull. Calif. Acad. 1: 280. 1885.

Mimulus serotinus Suksd. Deutsch. Bot. Monatss. 18: 154. 1900.

Mimulus deltoideus Gandoger, Bull. Soc. Bot. Fr. 66: 218. 1919.

Annual villosely glandular-pubescent herb, the much-branched stems weak (sometimes diminutive), erect or widely diffuse, usually 0.5–3.5 dm. long. Leaf-blades ovate, sharply dentate (or entire in dwarfs), subpalmately veined, rounded or cordate to petioles usually one-third to two-thirds length of blades, the larger blades 1–3 cm. long; pedicels 5–25 mm. long; calyx 5–7 mm. long, ridged to slightly plicate-angled, its lobes 1–1.5 mm. long, acuminate, ciliate; corolla 5–12 mm. long, yellow, the throat narrowly campanulate, ventrally with 2 ridges pubescent with minute clavate hairs and with fine orange-rufous spots, the orifice open and the lobes little spreading; anthers glabrous; capsule 5 mm. long, dehiscing tardily through septum-apex.

Moist places, especially sandy or stony, Upper Sonoran and Transition Zones; British Columbia to northern Lower California, east to South Dakota, Colorado, and Chihuahua. Type locality: "interior of the districts of the river Columbia." April–Sept.

22. *Mimulus multiflorus* Pennell. Many-flowered Monkey-flower. Fig. 4542.

Mimulus multiflorus Pennell, Proc. Acad. Phila. 99: 161. 1947.

Annual glandular-pilose to -villose herb, the much-branched stems diffusely ascending, 2 dm. long. Leaf-blades lance-ovate, entire to remotely denticulate, pinnately veined, cuneately rounded to petioles less than one-half the length of blades, the largest blades 1.4–1.6 cm. long; pedicels 9–14 mm. long; calyx 5–6 mm. long, ridge- to wing-angled, its lobes acute and the intervening margin ciliate; corolla 10–13 mm. long, yellow, the throat cylindric-campanulate, ventrally with low short-pubescent ridges, paler and with fine brown spots, the orifice open and the spreading lobes rounded; anthers glabrous; capsule 5 mm. long, not dehiscing through septum-apex.

Moist granitic sand, Transition Zones; lower slopes of Sierra Nevada in Fresno County, California. Type locality: Dunlap, Fresno County, California. June–August.

23. *Mimulus trisulcatus* Pennell. Three-furrowed Monkey-flower. Fig. 4543.

Mimulus trisulcatus Pennell, Proc. Acad. Phila. 99: 161. 1947.

Annual herb, pilose to villose with glandless and interspersed glandular hairs, the simple or

loosely branched stems ascending, 0.5–2 dm. long. Leaf-blades ovate or lance-ovate, entire to slightly dentate, pinnately veined, 1.3–1.8 cm. long, rounded to petioles less than one-half the length of blades; calyx 7–9 mm. long, ridge-angled, its lobes acuminate, finely ciliate; corolla 15–17 mm. long, yellow, the throat narrowly campanulate, ventrally with 2 highly raised ridges pubescent with clavate hairs, toward and below the open orifice with orange to brown spots, the spreading lobes rounded; anthers glabrous; capsule 6 mm. long, not dehiscing through septum-apex.

Moist granitic gravelly soil, Canadian Zone; Sierra Nevada in Tulare County, California. Type locality: Mineral King, Tulare County, California. July–Aug.

24. *Mimulus Whipplei* Grant. Whipple's Monkey-flower. Fig. 4544.

Mimulus Whipplei Grant, Ann. Mo. Bot. Gard. 11: 484. 1925.

Annual glandular-pubescent herb, the stems 1.5 dm. tall. Leaf-blades oval or elliptic-oval, coarsely dentate, palmately veined, 2 cm. long, cuneate to petioles 1.5 cm. long; pedicels at least 30–40 mm. long; calyx 7–8 mm. long, plicate, its lobes acuminate, the uppermost slightly the longest; corolla 20–22 mm. long, yellow, its orifice open and the rounded lobes widely spreading.

Rocky places, Transition Zones; Sierra Nevada in Calaveras County, central California. Type locality: Murphy's, Calaveras County. May.

25. *Mimulus arenarius* Grant. Sand-loving Monkey-flower. Fig. 4545.

Mimulus arenarius Grant, Ann. Mo. Bot. Gard. 11: 215. 1925.

Annual finely glandular-pilose herb, the stems erect or ascending, 0.5–1.5 dm. tall. Leaf-blades elliptic or narrowly so, dentate to entire, 0.8–1.5 cm. long, short or indistinctly petioled, the lower more evidently so; pedicels 12–23 mm. long; calyx 6–9 mm. long, ridge- to wing-angled, its lobes 1 mm. long, acute; corolla 13–16 mm. long, yellow, the throat cylindric, ventrally with 2 sharp stiffly hairy ridges and beneath the open orifice and over base of lower lip mottled with dark red, the spreading lobes rounded; anthers glabrous; capsule 7 mm. long, not dehiscing through septum-apex.

Moist sandy soil, Transition Zones; lower slopes of Sierra Nevada from Mariposa County to Fresno County, California. Type locality: Huntington Lake, Fresno County, California. May–July.

26. *Mimulus Pulsiferae* A. Gray. Candelabrum Monkey-flower. Fig. 4546.

Mimulus Pulsiferae A. Gray, Proc. Amer. Acad. 11: 98. 1876.

Annual glandular-puberulent herb, the stems erect, 0.5–1.5 dm. tall. Leaf-blades elliptic-oblong, denticulate to entire, 0.7–1.5 cm. long, narrowed to petioles about half the length of blades; pedicels divaricately upcurving, 12–18 mm. long; calyx 7–9 mm. long, ridge-angled, its lobes 1 mm. long, acute; corolla 9–11 mm. long, yellow, the throat narrowly campanulate, ventrally pubescent (especially on the 2 ridges) and beneath the open orifice, and over base of mid-anterior lobe brown-spotted and mottled, the spreading lobes all rounded; anthers glabrous; capsule 7 mm. long, not dehiscing through septum-apex.

Moist openings in coniferous forest, Transition Zones; southern Washington south to Mariposa County, California. Type locality: Indian Valley, California. April–June.

27. *Mimulus washingtonensis* Gandoger. Washington Monkey-flower. Fig. 4547.

Mimulus washingtonensis Gandoger, Bull. Soc. Bot. Fr. 66: 218. 1919.

Annual glandular-pubescent herb, the often much-branched stems ascending or erect, 0.5–1.5 dm. tall. Leaf-blades ovate, denticulate, 0.6–1.5 cm. long, rounded or truncate to petioles nearly or quite as long as blades; pedicels ascending, 20–30 mm. long; calyx 6–8 mm. long, ridge-angled, its lobes 1 mm. long, acute; corolla 12–15 mm. long, yellow, the throat narrowly campanulate, ventrally pubescent (especially on the 2 ridges) and beneath the open orifice slightly brown-spotted, the lobes all rounded, the lower longer; anthers glabrous; capsule 7 mm. long, not dehiscing through septum-apex.

Moist sandy soil, Upper Sonoran Zone; interior valley of Columbia River, Klickitat County, Washington, to Grant County, Oregon. Type locality: Bingen, Washington. May–Sept.

28. *Mimulus patulus* Pennell. Stalk-leaved Monkey-flower. Fig. 4548.

Mimulus patulus Pennell, Proc. Acad. Phila. 99: 162. 1947.

Annual glandular-pilose herb, the stems ascending, 1–2 dm. tall. Leaf-blades ovate, undulately dentate, palmately 3-veined, 0.5–1.2 cm. long, rounded-truncate to petioles 1 to 2 times length of blades; pedicels ascending, 13–20 mm. long; calyx 6–7 mm. long, glandular-puberulent, ridge- to wing-angled, its lobes 0.5–0.8 mm. long, acutish to acute; corolla 7–9 mm. long, yellow, the throat narrowly campanulate, ventrally with 2 low slightly pubescent ridges, the orifice open and the lobes rounded; anthers glabrous; capsule 5 mm. long, not dehiscing through septum.

Moist banks of streams and ditches, Transition Zones; interior plateau from Whitman County, southeastern Washington, to Lake County, southern Oregon. Type locality: Wawawai, Washington. May–July.

29. *Mimulus alsinoides* Dougl. Chickweed Monkey-flower. Fig. 4549.

Mimulus alsinoides Dougl. ex. Benth. Scroph. Indicae 29. 1935.

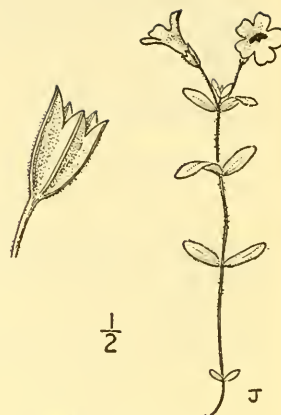
Annual herb, slightly glandular-pubescent to glabrescent, often much-branched, the stems



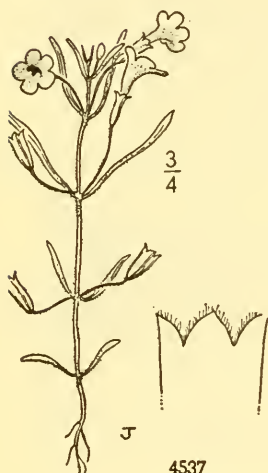
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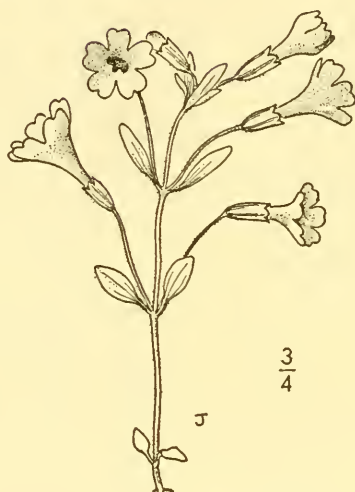
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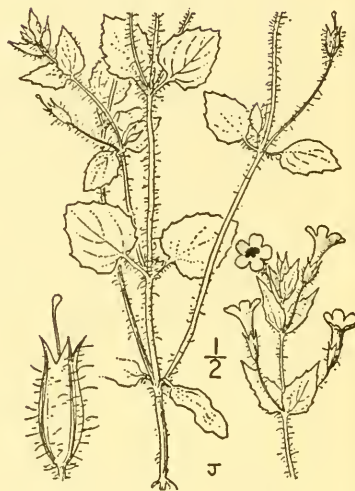
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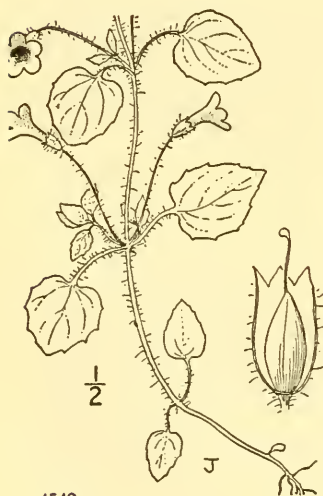
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4534. *Mimulus bicolor*
4535. *Mimulus Biolettii*
4536. *Mimulus filicaulis*

4537. *Mimulus discolor*
4538. *Mimulus Palmeri*
4539. *Mimulus subulatus*

4540. *Mimulus Dudleyi*
4541. *Mimulus floribundus*
4542. *Mimulus multiflorus*



4543



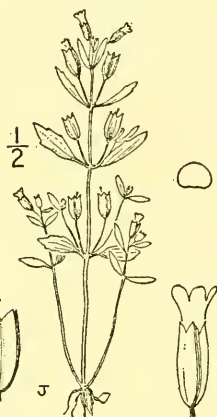
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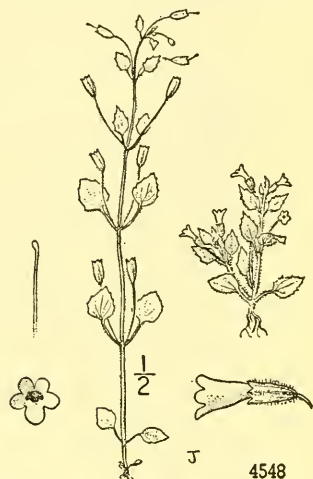
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4543. *Mimulus trisulcatus*
 4544. *Mimulus whipplei*
 4545. *Mimulus arenarius*

4546. *Mimulus pulcherrimus*
 4547. *Mimulus washingtonensis*
 4548. *Mimulus patulus*

4549. *Mimulus alsinoides*
 4550. *Mimulus breviflorus*
 4551. *Mimulus latidens*

ascending or decumbent, 0.5–2.5 dm. long. Leaf-blades ovate, denticulate, 1–2 cm. long, rounded or truncate to petioles about as long as to longer than blades; pedicels 10–30 mm. long; calyx 6–8 mm. long, becoming plicate-angled, its upper lobes 0.3–0.5 mm. long, acute, the lower lobes slightly longer and usually rounded; corolla 10–12 mm. long, yellow, the throat narrowly campanulate, ventrally flattened, only faintly 2-ridged and glabrous, the orifice open, the upper lobes ascending, the lower longer and with large dark purple spot over the base of its middle lobe; anthers glabrous; capsule 5–6 mm. long, not dehiscent through septum-apex.

Wet rock clefts and cliffs, Transition Zones; Vancouver Island to northern California. Type locality: Tongue Point, Wahkiakum County, Washington. March–June.

30. *Mimulus breviflorus* Piper. Short-flowered Monkey-flower. Fig. 4550.

Mimulus breviflorus Piper, Bull. Torrey Club 28: 45. 1901.

Mimulus inflatus Suksd. Werdenda 1: 38. 1927.

Annual glandular-puberulent herb, often much-branched below, the stems erect, 0.3–1.5 dm. tall. Leaf-blades elliptic-lanceolate, denticulate, palmately 3-veined, 0.5–2 cm. long, narrowed to petioled or nearly sessile bases; pedicels becoming 5–13 mm. long; calyx 5–8 mm. long, wing- and somewhat plicate-angled, its lobes 0.5–1 mm. long, acute; corolla 4–5 mm. long, little exceeding the calyx, yellow, the throat tubular-cylindric, ventrally with 2 low ridges bearing short knobbed hairs and faint brownish spots, the orifice open and the scarcely spreading lobes rounded; anthers glabrous; capsule 4–5 mm. long, not dehiscent through septum-apex.

Moist places along streams, Upper Sonoran and Transition Zones; southeastern Washington and Idaho to northern California. Type locality: Pullman, Washington. May–June.

31. *Mimulus látidens* (A. Gray) Greene. Broad-toothed Monkey-flower. Fig. 4551.

Mimulus inconspicuus var. *latidens* A. Gray, Syn. Fl. N. Amer. ed. 2, 2¹: 450. 1886.

Mimulus latidens Greene, Man. Bay Reg. 278. 1894.

Annual finely glandular-pilose herb, forming a spring rosette of petioled ovate irregularly dentate leaves, the erect or laterally decumbent stems 1.5–2.5 dm. tall with a few remote pairs of sessile and more acute leaf-blades, the larger lower blades reaching 2.5–4 cm. long. Pedicels becoming 20–30 mm. long; calyx 10–12 mm. long, plicate-angled, contracted distally, its lobes 1–2 mm. long, ovate, acute, slightly ciliolate; corolla 10–11 mm. long, whitish, little exceeding the calyx, the throat cylindric, ventrally with 2 low slightly pubescent ridges, the orifice open and the short lobes scarcely spreading, purplish; anthers glabrous; capsule 7 mm. long, not dehiscent through septum-apex.

Wet adobe soil, Upper Sonoran Zone; northern California to northern Lower California. Type locality: Chollas Valley, San Diego County, California. April–June.

32. *Mimulus Parishii* Greene. Parish's Monkey-flower. Fig. 4552.

Mimulus Parishii Greene, Bull. Calif. Acad. 1: 108. 1885.

Annual hirsute herb, with ample root system, the stout stems erect, 1.5–6 dm. tall. Leaf-blades oblanceolate to oblong, longitudinally 3-veined, distally denticulate to dentate, 3 cm. long, all narrowed to clasping bases; pedicels ascending-erect, 15–18 mm. long; calyx 9–10 mm. long, ridge- to wing-angled, its lobes 1 mm. long, acute; corolla 10–13 mm. long, pale purple, little exceeding the calyx; anthers glabrous; capsule 5 mm. long, probably dehiscent through septum-apex.

Streamsides in desert mountains, Upper Sonoran Zone; bases of San Gabriel, San Bernardino and San Jacinto Mountains in southern California. Type locality: Cox's Ranch, on Mojave slope of San Bernardino Mountains, California. May–Aug.

33. *Mimulus montioides* A. Gray. Montia-like Monkey-flower. Fig. 4553.

Mimulus montioides A. Gray, Proc. Amer. Acad. 7: 380. 1868.

Annual glandular-puberulent herb, the stems erect or ascending, 0.2–0.5 dm. tall. Leaf-blades linear-oblanceolate, entire, 1-veined, 0.7–1.3 cm. long, sessile; pedicels 5–13 mm. long; calyx 5–7 mm. long, ridge-angled, its lobes 0.5 mm. long, acute to rounded; corolla 12–17 mm. long, yellow, the throat campanulate, ventrally 2-ridged and minutely pubescent, the orifice open and the lobes spreading, notched, the lowermost sometimes with 1 or several purple spots; anthers glabrous.

Moist places, Transition and probably Canadian Zones; southern Sierra Nevada of California and mountains east of Lake Tahoe in Nevada. Type locality: "High sierras of Fresno," actually Tulare County, California. March–June.

34. *Mimulus rubellus* A. Gray. Ciliolate-toothed Monkey-flower. Fig. 4554.

Mimulus rubellus A. Gray, Bot. Mex. Bound. 116. 1859. The purple-flowered form.

Mimulus gratioides Rydb. Bull. Torrey Club 28: 27. 1901. The yellow-flowered form.

Annual glandular-puberulent herb, the stems erect, often much branched, 0.2–1.2 dm. tall. Leaf-blades elliptic-oblong, entire or slightly toothed, 3-veined, 0.5–2 cm. long, sessile (the lowest smaller and petioled); pedicels becoming 7–22 mm. long; calyx 5–7 mm. long, ridge- to wing-angled, its lobes low-triangular or its mucronate tips less than 0.5 mm. long; corolla 7–9 mm. long, yellow throughout or the lobes purple, the throat narrow, ventrally 2-ridged and puberulent,

the orifice open and the slightly spreading lobes notched; anthers glabrous; capsule 4 mm. long, not dehiscing through septum-apex.

Moist sandy soil, especially in piñon-juniper belt, Upper Sonoran Zone; southeastern California to southern Colorado and New Mexico. Type locality: Organ Mountains of southern New Mexico. May–June.

35. *Mimulus Suksdorfii* A. Gray. Suksdorf's Monkey-flower. Fig. 4555.

Mimulus Suksdorfii A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 450. 1886.

Annual glandular-puberulent herb, stems erect or diffuse, usually densely much-branched, 0.1–0.6 dm. tall. Leaf-blades oblanceolate or oblong, entire, 1- or obscurely 3-veined, 1–1.5 cm. long, sessile (the lowest much smaller and petioled); pedicels becoming 2–8 mm. long; calyx 4–6 mm. long, ridged and slightly wing-angled, its lobes rounded-mucronulate, less than 1 mm. long; corolla 5–7 mm. long, yellow (or rarely purple-lobed), the throat narrow, ventrally with 2 low puberulent ridges and faintly brown-spotted, the orifice open and the lobes notched; anthers glabrous; capsule 4 mm. long, not dehiscing through septum-apex.

Moist sandy soil or rock crevices, Upper Sonoran Zone to Canadian Zone; southern Washington to southern California, east to Wyoming and Colorado. Type locality: Mount Paddo [Adams], Washington. May–Aug.

36. *Mimulus androsaceus* Curran. Androsace Monkey-flower. Fig. 4556.

Mimulus androsaceus Curran ex Greene, Bull. Calif. Acad. 1: 121. 1885.

Annual glandular-puberulent herb, the stems erect or ascending, 0.1–0.6 dm. tall. Leaf-blades oblong-lanceolate, entire or distally blunt-toothed, nearly veinless, 0.3–0.7 cm. long, clasping or slightly connate; pedicels becoming 15–27 mm. long; calyx 5–6 mm. long, ridged to wing-angled, its lobes nearly 1 mm. long, rounded-mucronulate; corolla 7–8 mm. long, purple, throat narrow, yellowish or purple, ventrally with low yellow and slightly purple-spotted ridges, the orifice open and the spreading lobes all rounded and slightly emarginate; anthers glabrous; capsule 4 mm. long, not dehiscing through septum-apex.

Sandy or stony chaparral, Upper Sonoran Zone; Santa Clara County to Kern and Los Angeles Counties, California. Type locality: Tehachapi, California. March–June.

37. *Mimulus barbatus* Greene. Bearded Monkey-flower. Fig. 4557.

Mimulus barbatus Greene, Bull. Calif. Acad. 1(1): 9. 1884.

Mimulus deflexus S. Wats. Proc. Amer. Acad. 24: 84. 1889.

Annual finely glandular-pubescent herb, the stems erect, 0.1–0.3 dm. tall. Leaf-blades linear to narrowly oblong, entire, nearly veinless, 0.9–1.2 cm. long, narrowed to slightly connate bases; pedicels 5–13 mm. long, becoming deflexed-spreading; calyx 4–5 mm. long, ridge-angled, its lobes about 0.5 mm. long, rounded-mucronate; corolla 10–15 mm. long, yellow, or the upper lip or even the whole corolla violet-purple, the tube narrow and about twice as long as the calyx, the throat short and campanulate, its orifice open, the upper lip ascending, the lower deflexed, proximally pubescent and usually purple-marked, the lobes all emarginate to notched; anthers glabrous, exerted beneath upper corolla-lip; stigmas ciliate-fringed; capsule at least 4 mm. long.

Granitic sand in mountain meadows, Canadian Zone; Tulare County, California. Type locality: unknown. June–Aug.

38. *Mimulus gracilipes* Robinson. Slender-stalked Monkey-flower. Fig. 4558.

Mimulus gracilipes Robinson, Proc. Amer. Acad. 26: 176. 1891.

Annual minutely glandular-puberulent herb, the stems erect, 0.6–1.5 dm. tall. Leaf-blades lanceolate to narrowly oblong, entire or denticulate, 3-veined, narrowed to slightly connate bases; pedicels 15–25 mm. long; calyx 4–5 mm. long, in anthesis nearly plane, its lobes about 1 mm. long, ovate-rounded, ciliate; corolla 12–15 mm. long, purple, the throat campanulate, ventrally puberulent and with 2 low yellow ridges, orifice open, upper lip ascending, lower deflexed-spreading, all lobes rounded; anthers glabrous.

Probably gravelly soil or rock ledges, Transition Zones; Mariposa County of central California. Type locality, Mormon Bar, Mariposa County, California. April–May.

39. *Mimulus purpureus* Grant. Little Purple Monkey-flower. Fig. 4559.

Mimulus purpureus Grant, Ann. Mo. Bot. Gard. 11: 255. 1925.

Annual glandular-pubescent herb, the stems erect, 0.2–1 dm. tall. Leaf-blades oblong-lanceolate, entire or nearly so, obscurely 3–5 veined, 1–1.5 cm. long, slightly clasping at base; pedicels becoming 40–50 mm. long; calyx 6–8 mm. long, only slightly ridged, its lobes 0.5–1 mm. long, ovate-rounded, mucronulate; corolla 12–15 mm. long, purple, the throat narrow, ventrally obscurely or not ridged, glabrous, the orifice open, upper lip arched-ascending, lower deflexed-spreading, lobes rounded-emarginate; anthers glabrous; stigmas ciliate-fringed; capsule 6 mm. long, dehiscing slightly through septum-apex.

Probably sandy soil, Transition Zones; San Bernardino and San Jacinto Mountains of southern California. Type locality: Bear Valley, San Bernardino Mountains, California. June–July.

40. *Mimulus diffusus* Grant. Mrs. Grant's Monkey-flower. Fig. 4560.

Mimulus diffusus Grant, Ann. Mo. Bot. Gard. 11: 254. 1925.

Mimulus Grantianus Eastw. Bull. Calif. Acad. IV. 20: 153. 1931. The lobed-leaved form.

Annual glandular-puberulent herb, the stems becoming much-branched and widely diffuse, 0.5–2.5 dm. tall. Leaf-blades oblong-lanceolate, entire to deeply and doubly dentate-lobed, 1–1.5 cm. long, sessile; pedicels 25–45 mm. long; calyx 5–7 mm. long, ridged or slightly wing-angled, its lobes 0.5–1 mm. long, rounded-ovate, mucronate, eciliate; corolla 12–15 mm. long, purple, throat campanulate, ventrally with 2 yellow puberulent sharp ridges and proximally with a considerable yellow area, the orifice open, the lobes spreading, notched, and proximally pilose; anthers glabrous; stigmas fringed; capsule 6 mm. long, dehiscing slightly through septum-apex.

Moist sandy soil, Upper Sonoran Zone; San Jacinto Mountains of southern California to mountains of northern Lower California. Type locality: Palomar, San Diego County, California. April–June.

41. *Mimulus exiguus* A. Gray. Mean Monkey-flower. Fig. 4561.

Mimulus exiguus A. Gray, Proc. Amer. Acad. 20: 307. 1885.

Annual glandular-puberulent herb, the diffusely tenuous stems 0.5–0.7 dm. tall. Leaf-blades oblong-lanceolate, entire or distally obscurely blunt-toothed, nearly veinless, 0.3–0.6 cm. long, sessile; pedicels very slender, becoming 15–20 mm. long; calyx 2–2.5 mm. long, nearly plane, its lobes about 0.5 mm. long, acutish; corolla 2–2.5 mm. long, purple, the throat narrow, the minute lobes only slightly opening (so that the flower is presumably self-pollinated); anthers glabrous; stigmas entire; capsule 3 mm. long, only tardily dehiscing through septum-apex.

Probably sandy soil, Upper Sonoran or Transition Zones; San Bernardino Mountains of southern California, and in mountains of northern Lower California. Type locality: near Hanson's Ranch, in northern Lower California. June–July.

42. *Mimulus pilosus* (Benth.) S. Wats. Downy Mimetanthe. Fig. 4562.

Herpestis pilosa Benth. Comp. Bot. Mag. 2: 57. 1836.

Mimulus exilis Dur. & Hilg. Journ. Acad. Phila. II. 3: 43. 1855.

Mimulus pilosus S. Wats. Bot. King Expl. 225. 1871.

Mimetanthe pilosa Greene, Bull. Calif. Acad. 1: 181. 1886.

Annual villose herb, the erect stems 1–4 dm. tall. Leaf-blades oblanceolate or oblong, entire, pinnately veined, 1–9 cm. long, narrowed to sessile bases; pedicels becoming 10–35 mm. long; calyx 6–7 mm. long, plane, its lobes unequal, uppermost one longest, the upper lateral pair slightly shorter, the lowest pair shortest and about as long as the calyx-tube; corolla 4–9 mm. long, yellow, the throat tubular-cylindric, ventrally with 2 vestigial slightly hairy maroon-spotted ridges, the lobes rounded and spreading, with a blackish maroon blotch to either side of base of lowermost lobe; anthers glabrous (but filaments distally minutely pubescent); capsule 4–7 mm. long, dehiscing distally through septum one-third to half the length.

Gravelly bars and stream banks, Upper Sonoran and Transition Zones; Washington to Lower California, east to Utah and Arizona. Type locality: California. April–Sept.

43. *Mimulus nudatus* Curran. Bare Monkey-flower. Fig. 4563.

Mimulus nudatus Curran ex Greene, Bull. Calif. Acad. 1: 114. 1885.

Annual glabrescent herb, the erect stems 1–1.5 dm. tall, finely glandular-pubescent just above nodes. Leaf-blades oblong-lanceolate, denticulate to proximally dentate-lobed, obscurely palmately veined, 0.5–1.5 cm. long, narrowed to petioles longer than or the upper shorter than the blades, the uppermost much smaller, linear and nearly sessile; pedicels becoming 25–30 mm. long; calyx 10–12 mm. long, plicate-angled, its lobes acute, the lower shorter than and upcurving against the uppermost which is about 2 mm. long; corolla 15–20 mm. long, yellow, the throat ventrally with 2 rounded upraised ridges that nearly close orifice, these and the raised palate deeper yellow, densely hairy, and brown-spotted, lower lip with deflexed lobes, upper lip shorter and paler, ascending-arched; anthers glabrous; stigmas fimbriate; capsule 6 mm. long, not dehiscing through septum-apex.

Open gravelly places in coniferous forest, Upper Sonoran Zone; Lake County, northern California. Type locality: Kelsey Mountain, Lake County, California. May–June.

44. *Mimulus laciniatus* A. Gray. Cut-leaved Monkey-flower. Fig. 4564.

Mimulus laciniatus A. Gray, Proc. Amer. Acad. 11: 98. (January) 1876.

Mimulus Eisenii Kell. Proc. Calif. Acad. 7: 89. (August or later) 1876.

Annual glabrescent herb, the erect stems 0.5–3.5 dm. tall, finely glandular-pubescent above nodes. Leaf-blades oblong to nearly oval in general outline but usually strongly pinnatifid-lobed, cut nearly to midrib and the segments sometimes dentate or lobed, all narrowed to petioled bases, or the upper sometimes sessile; pedicels 15–45 mm. long; calyx becoming 8–10 mm. long, strongly plicate-angled, its lobes acute, lower shorter than and upcurving against the uppermost which is usually fully twice as long; corolla 6–13 mm. long, yellow, the throat ventrally with 2 rounded upraised ridges that partially close orifice, these and the raised palate somewhat hairy and brown-spotted or usually distally blotched, lower lip with deflexed-spreading lobes, upper lip shorter and paler, ascending-arched; anthers glabrous; stigmas slightly fimbriate; capsule 6 mm. long, not dehiscing through septum-apex.

Moist rock crevices and stony soil, Canadian Zone; southern Sierra Nevada from Tuolumne County to Tulare County, California. Type locality: South Fork of Merced River, Mariposa County, California. May–Aug.

45. *Mimulus nasutus* Greene. Snouted Monkey-flower. Fig. 4565.

Mimulus nasutus Greene, Bull. Calif. Acad. 1: 112. 1885.

Mimulus glareosus Greene, Pittonia 1: 282. 1889.

Mimulus subreniformis Greene, Erythea 3: 67. 1895.

Mimulus marmoratus Greene, op. cit. 73.

Mimulus Langsdorffii var. *nasutus* Jepson, Fl. W. Mid. Calif. 407. 1901.

Mimulus cuspidatus Greene, Leaflets Bot. Obs. 2: 6. 1909.

Mimulus puberulus Gandoger, Bull. Soc. Bot. Fr. 66: 219. 1919.

Mimulus Parishii Gandoger, loc. cit.

Mimulus Bakeri Gandoger, loc. cit.

Mimulus puncticalyx Gandoger, loc. cit.

Mimulus guttatus var. *nasutus* Jepson, Man. Fl. Pl. Calif. 928. 1925.

Annual herb, finely pubescent to glabrate, the stems erect or nearly so, 1-10 dm. tall. Leaf-blades orbicular-ovate, irregularly and often saliently dentate to proximally dentate-lobed, palmately veined, the lower 0.5-7 cm. long, rounded or cordate to petioles, the upper much smaller; pedicels 5-35 mm. long, glandular-pubescent near base on upper side, elsewhere glabrous or finely pubescent; calyx becoming 10-20 mm. long, strongly plicate-angled, usually dark-dotted, its lobes very acute, the lower shorter and the lowest eventually upcurved about 90° so as to close against the lance-attenuate uppermost lobe which is 3-7 mm. long; corolla 13-30 mm. long, yellow, the throat ventrally with 2 rounded upraised hairy ridges that unite distally to form a prominent palate that closes the orifice, this ventral side deeper yellow, with small brown spots and usually with a large maroon blotch on base of lowermost corolla-lobe, lower lip with deflexed-spreading lobes, upper lip shorter and ascending; anthers glabrous. Stigmas fimbriate; capsule 5-10 mm. long, not dehiscing through septum-apex.

Wet sandy or gravelly places, Upper Sonoran and Transition Zones; Vancouver Island to northern Lower California, east to Idaho, Utah, and Arizona. Type locality: Knight's Valley, Sonoma County, California. March-Aug.

46. *Mimulus pardalis* Pennell. Mottled Monkey-flower. Fig. 4566.

Mimulus pardalis Pennell, Proc. Acad. Phila. 99: 164. 1947.

Annual herb, loosely glandular-pilose, the stems erect or decumbent, 0.5-2 dm. tall. Leaf-blades widely ovate, acute, sharply dentate, palmately 3-veined, 1.5-3 cm. long, truncately rounded to petioles rather shorter than blades, the uppermost narrowed and sessile; pedicels becoming 15-60 mm. long; calyx 7-10 mm. long, purple-spotted and -mottled, strongly plicate-angled, its lobes acute, lowest pair upcurved even to 90° against the longest uppermost one which is 1.5 mm. long; corolla 8-15 mm. long, yellow, the throat nearly cylindric, ventrally with 2 finely pubescent ridges, lower lip with deflexed-spreading lobes, upper lip shorter and ascending; anthers glabrous; capsule stipitate within the inflated calyx, 3.5 mm. long, not dehiscing through septum-apex.

Crevices of serpentine rock, Upper Sonoran Zone; lower Sierra Nevada from Amador County to Tuolumne County, California. Type locality: Peoria Flat, Tuolumne County, California. April.

47. *Mimulus decorus* (Grant) Suksd. Sharp-leaved Large Monkey-flower. Fig. 4567.

Mimulus guttatus var. *decorus* Grant, Ann. Mo. Bot. Gard. 11: 173. 1925.

Mimulus decorus Suksd. Werdenda 1: 37. 1927.

Annual nearly glabrous herb, stoloniferous, the stems erect, 3-10 dm. tall. Leaf-blades ovate, acute to obtusish, usually saliently dentate, palmately veined, 3-6 cm. long, truncately narrowed to petioles shorter than blades, the upper sessile; pedicels becoming 20-50 mm. long, finely pubescent with glandless hairs; calyx becoming 15-20 mm. long, strongly plicate-angled, its lobes acute, the lower shorter, the lowest pair upcurved toward or against the uppermost which is 3-4 mm. long; corolla 30-50 mm. long, yellow, the throat ventrally with 2 hairy and brown-spotted ridges joined distally into a palate that only partially closes the orifice, lower lip with deflexed-spreading lobes, upper lip shorter and with erect lobes; anthers glabrous; stigmas fimbriate; capsule 11 mm. long, not dehiscing through septum-apex.

Springs and stream courses in coniferous forest, Transition and Canadian Zones; coastal Washington and Oregon, east to northern Idaho. Type locality: Oregon City, Oregon. June-Aug.

48. *Mimulus veronicifolius* Greene. Olympic Large Monkey-flower. Fig. 4568.

Mimulus veronicifolius Greene, Leaflets Bot. Obs. 2: 7. 1909.

Probably annual nearly glabrous herb, stoloniferous, the stems erect, 1-3 dm. tall. Leaf-blades ovate, acute to obtuse, denticulate to somewhat dentate, palmately veined, 1.5-3 cm. long, cuneately narrowed to petioles shorter than blades, the upper sessile; pedicels becoming at least 40-50 mm. long, finely pubescent with glandless hairs to glabrous; calyx in anthesis 15 mm. long, strongly plicate-angled, its lobes acute, the lower shorter, the uppermost 3-4 mm. long; corolla 35-45 mm. long, yellow, the throat ventrally with 2 densely hairy and finely brown-spotted ridges joined distally into a palate that only partially closes the orifice, lower lip with deflexed-spreading lobes, upper lip shorter and with erect lobes; anthers glabrous; stigmas fimbriate.

Alpine stream banks and swales, Hudsonian Zone; Olympic Mountains of western Washington. Type locality: Olympic Mountains. July-Aug.



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4552. *Mimulus parishii*
 4553. *Mimulus montioides*
 4554. *Mimulus rubellus*
 4555. *Mimulus suksdorfii*

4556. *Mimulus androsaceus*
 4557. *Mimulus barbatus*
 4558. *Mimulus gracilipes*

4559. *Mimulus purpureus*
 4560. *Mimulus diffusus*
 4561. *Mimulus exiguus*



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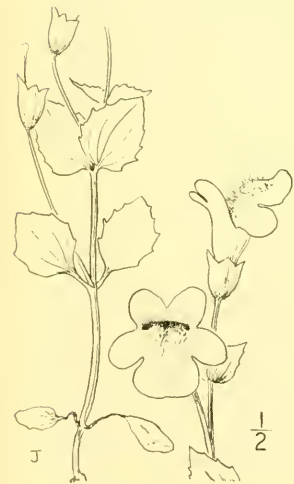
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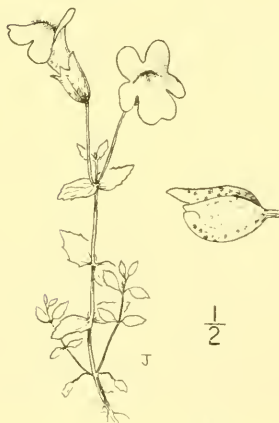
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4562. *Mimulus pilosus*
 4563. *Mimulus nudatus*
 4564. *Mimulus laciniatus*

4565. *Mimulus nasutus*
 4566. *Mimulus pardalis*
 4567. *Mimulus decorus*

4568. *Mimulus veronicifolius*
 4569. *Mimulus minor*
 4570. *Mimulus caespitosus*

49. *Mimulus minor* A. Nels. Smaller Mountain Monkey-flower. Fig. 4569.

Mimulus minor A. Nels. Proc. Biol. Soc. Wash. 17: 178. 1904.

Perennial herb, finely pubescent distally, rhizomatose and stoloniferous, the stems ascending or diffuse, 1–3 dm. long. Leaf-blades elliptic-ovate or somewhat narrower, finely to saliently dentate, palmately veined, 1–2 cm. long, truncately narrowed to short petioles; pedicels becoming 20–50 mm. long, minutely pubescent with essentially glandless hairs; calyx becoming 12–15 mm. long, strongly plicate-angled, its lobes acute, the lower shorter, the lowest pair eventually upcurved toward or against the uppermost one which is 3–4 mm. long; corolla 20–30 mm. long, yellow, its throat ventrally with 2 densely hairy and finely red-brown-spotted ridges joined distally into a palate that closes the orifice, lower lip with deflexed-spreading lobes, upper lip shorter and with ascending lobes; anthers glabrous; stigmas fimbriate; capsule stiped within calyx, 7 mm. long, not dehiscing through septum-apex.

Springs and stream banks, Hudsonian Zone; mountains of northeastern Oregon eastward to central Idaho and southern Wyoming, south to Utah and northern New Mexico. Type locality: near Boulder, Colorado. July–Aug.

50. *Mimulus caespitosus* Greene. Tufted Monkey-flower. Fig. 4570.

Mimulus scouleri var. *caespitosus* Greene, Pittonia 2: 22. 1889.

Mimulus caespitosus Greene, Journ. Bot. Brit. & For. 33: 8. 1895.

Mimulus Tilingii var. *caespitosus* Grant, Ann. Mo. Bot. Gard. 11: 154. 1925.

Perennial herb, distally finely pubescent, the crowded stems decumbent, 0.3–1 dm. tall, with creeping small-leaved runners. Leaf-blades narrowly elliptic to ovate, obtuse, denticulate to entire, palmately 3-veined, 0.5–1.2 cm. long, cuneately narrowed to short petioles, the middle more rounded, the upper sessile; pedicels becoming 30–60 mm. long; calyx becoming 11–15 mm. long, strongly plicate-angled, its lobes acute, the lower shorter, the lowest pair eventually upcurved toward the uppermost one which is 3–5 mm. long; corolla 20–30 mm. long, yellow, its throat ventrally deeper yellow, with 2 hairy and brown-spotted ridges joined distally into a palate that partially closes the orifice, lower lip with deflexed-spreading lobes, upper lip somewhat shorter and with ascending lobes; anthers glabrous; stigmas fimbriate; capsule slightly stiped, 7 mm. long, not dehiscing through septum-apex.

Stream banks and wet rock crevices, Hudsonian Zone; Cascade and Olympic Mountains of Washington, to the Selkirk Mountains of southern British Columbia. Type locality: Mount Rainier, Washington. July–Aug.

51. *Mimulus Tilingii* Regel. Larger Mountain Monkey-flower. Fig. 4571.

Mimulus Tilingii Regel, Gartenfl. 18: 321. pl. 631. 1869.

Mimulus implexus Greene, Journ. Bot. Brit. & For. 33: 8. 1895.

Mimulus lucens Greene, Leaflets Bot. Obs. 2: 7. 1909.

Perennial herb, from slender rhizomes, glabrescent or nearly so, the stems decumbent, 0.5–3 dm. tall, slightly stoloniferous. Leaf-blades ovate to oval or wider, acutish to usually obtuse, usually sinuately and saliently dentate, palmately veined, 1–3 cm. long, the lower rounded or truncate-cuneate to short petioles, the upper sessile; pedicels becoming 25–50 mm. long; calyx becoming 15–20 mm. long, strongly plicate-angled, its lobes acute, the lower shorter, the lowermost pair eventually upcurved toward the uppermost lobe which is 3–5 mm. long; corolla 25–35 mm. long, yellow, its throat ventrally deeper yellow, with 2 hairy and brown-spotted ridges joined distally into a palate that nearly or quite closes the orifice, lower lip with deflexed-spreading lobes, upper lip shorter and with ascending-erect lobes; anthers glabrous; stigmas slightly fimbriate; capsule slightly stiped, 7–8 mm. long, not dehiscing through septum-apex.

Rocky or gravelly mountain streams, often among moss, Canadian and Hudsonian Zones; mountains of Oregon and California, east to Montana and Colorado. Type locality: near Nevada City, California. July–Aug.

Mimulus Tilingii var. *corallinus* (Greene) Grant, Ann. Mo. Bot. Gard. 11: 155. 1925. (*Mimulus corallinus* Greene, Erythra 4: 21. 1896; *M. implicatus* Greene, Leaflets Bot. Obs. 1: 189. 1906; *M. minusculus* Greene, op. cit. 2: 5. 1909.) Foliage pubescent; pedicels 40–80 mm. long. Canadian and Hudsonian Zones; Mount Shasta south to San Jacinto Mountains, California, and on Mount Rose in western Nevada. Type locality: near Truckee, California.

52. *Mimulus microphyllus* Benth. Small-leaved Monkey-flower. Fig. 4572.

Mimulus microphyllus Benth. in A. DC. Prod. 10: 371. 1846.

Mimulus guttatus var. *microphyllus* Pennell ex M. E. Peck, Man. Pl. Oregon 654. 1941.

Annual minutely pubescent to glabrous herb, the stems erect to decumbent or repent at base, 0.5–2.5 dm. tall, simple to widely and laxly branched. Leaf-blades orbicular-ovate, denticulate to irregularly dentate, palmately veined, usually 0.5–1.5 cm. long (rarely to 3.5 cm. long), truncate or cordate to petioles shorter than blades or the upper sessile; pedicels very slender, 10–22 mm. long, finely pubescent to glabrous; calyx becoming 9–12 mm. long, strongly plicate-angled, its lobes acute, the lower shorter, the lowest pair strongly upcurved toward the uppermost lobe which is 2–3 mm. long; corolla 15–22 mm. long, yellow, its throat ventrally with 2 densely hairy and minutely brown-spotted ridges joined distally into a palate that nearly closes the orifice, lower lip with deflexed-spreading lobes, upper lip shorter and with erect lobes; anthers glabrous; stigmas fimbriate; capsule stipitate, 6–7 mm. long, not dehiscing through septum-apex.

Springy places and wet cliffs, Transition Zones; Cascade Mountains and coastal forests from northern Washington to northern California, east to central Idaho. Type locality: Tongue Point, in the present Wahkiakum County, Washington. May–Aug.

53. *Mimulus clementinus* Greene. San Clemente Monkey-flower. Fig. 4573.

Mimulus clementinus Greene, Leaflets Bot. Obs. 2: 5. 1909.

Annual minutely pubescent herb, the stems repent and laxly ascending, 2–4 dm. long. Leaf-blades nearly orbicular or slightly wider than long, simply and sharply dentate, palmately veined, 1.5–2 cm. long, the upper sessile and somewhat cordate; pedicels 15–20 mm. long, minutely pilose; calyx becoming 10 mm. long, strongly plicate-angled, its lobes mostly acute, the lower shorter, the lowest pair strongly upcurved against the uppermost lobe which is about 2 mm. long; corolla about 5 mm. long, yellow, presumably slightly 2-lipped and probably cleistogamous; stigmas fimbriolate; capsule 4 mm. long, not dehiscing through septum-apex.

Wet places, Upper Sonoran Zone; San Clemente Island, southern California. Type locality: San Clemente Island. May–July.

54. *Mimulus lyratus* Benth. Lyre-leaved Monkey-flower. Fig. 4574.

Mimulus lyratus Benth. Scroph. Indicae 28. 1835.

Mimulus guttatus var. *insignis* Greene, Man. Bay Reg. 277. 1894.

Mimulus Langsdorfii var. *insignis* Greene, Journ. Bot. Brit. & For. 33: 7. 1895.

Mimulus Langsdorfii var. *californicum* Jepson, Fl. W. Mid. Calif. 407. 1901.

Mimulus nasutus var. *insignis* Grant, Ann. Mo. Bot. Gard. 11: 181. 1925.

Mimulus guttatus var. *lyratus* Pennell ex M. E. Peck, Man. Pl. Oregon 654. 1941.

Annual herb, at least distally puberulent or finely pubescent, the stems erect, or decumbent at base, 2–9 dm. tall. Leaf-blades orbicular-ovate, saliently dentate, at least the lower basally lacerate- or pinnatifid-lobed, palmately veined, 2–5 cm. long, rounded or cordate to petioles (often obscured by extra lobules on petiole), the upper much smaller and often hirsute above; pedicels 10–40 mm. long; calyx becoming 12–22 mm. long, strongly plicate-angled, its lobes acute, the lower shorter, the lowest pair eventually upcurved toward the uppermost lobe which is 3–5 mm. long; corolla 15–35 mm. long, yellow, its throat ventrally with 2 widely rounded hirsute and finely brown-spotted ridges that join distally into an often large-blotched palate which closes the orifice, the lower much exceeding the upper corolla-lip; anthers glabrous; stigmas fimbriolate; capsule stipitate, 5–8 mm. long, not dehiscing through septum-apex.

Wet gravelly or muddy soil, openings in coniferous forest, Upper Sonoran and Transition Zones; southern Oregon to southern California. Type locality: California. March–July.

55. *Mimulus micranthus* Heller. Small-flowered Monkey-flower. Fig. 4575.

Mimulus micranthus Heller, Muhlenbergia 8: 132. 1912.

Mimulus nasutus var. *micranthus* Grant, Ann. Mo. Bot. Gard. 11: 182. 1925.

Annual herb, at least distally minutely or finely pubescent, the stems erect, 0.5–7 dm. tall. Leaf-blades orbicular-ovate, slightly to strongly and saliently dentate, at least the lower basally lacerate- or pinnatifid-lobed, palmately veined, 0.5–5 cm. long, rounded or cordate to petioles (often obscured by extra lobules on petiole), the upper much smaller and usually hirsute above; pedicels 5–30 mm. long; calyx becoming 8–14 mm. long, strongly plicate-angled, its lobes acute, the lower shorter, the lowest pair eventually upcurved toward the uppermost lobe which is 2–3 mm. long; corolla 5–10 mm. long, yellow, its throat ventrally with 2 low rounded pubescent and faintly brown-spotted ridges that join distally into a palate which partially closes the orifice, the lips little spreading and the lower only slightly the longer; anthers and stigmas together within orifice, evidently self-pollinating; capsule stipitate, 5–6 mm. long, not dehiscing through septum-apex.

Moist gravelly or muddy soil, along streams or in forest openings, Upper Sonoran and Transition Zones; Siskiyou County to Santa Clara and Mono Counties, California. Type locality: west of Congress Springs, Santa Clara County, California. April–June.

56. *Mimulus arvensis* Greene. Blunt-calyxed Monkey-flower. Fig. 4576.

Mimulus arvensis Greene, Pittonia 1: 37. 1887.

Mimulus Langsdorfii var. *arvensis* Jepson, Fl. W. Mid. Calif. 407. 1901.

Mimulus guttatus var. *arvensis* Grant, Ann. Mo. Bot. Gard. 11: 174. 1925.

Annual herb, glabrous below the pubescent to villose bracts, the stems erect, 4–8 dm. tall, simple or somewhat branched. Leaf-blades orbicular-ovate or -oval, dentate with bluntish teeth, proximally lacerate-lobed and often with several pairs of pinnules on petioles, palmately veined, 1–6 cm. long, rounded or cordate to petioles, the lower of which are often longer than blades, the upper much smaller and usually villose-hirsute; pedicels becoming 20–50 mm. long; calyx becoming 11–16 mm. long, strongly plicate-angled, its lower lobes mucronulate-acute to truncate, only slightly upcurved toward the longest uppermost one which is 1–3 mm. long; corolla 18–21 mm. long, yellow, its throat ventrally with 2 low pubescent brown-spotted ridges that join distally into a low palate which partially closes the orifice, the lips spreading and the lower somewhat the longer; anthers glabrous; stigmas fimbriolate; capsule stipitate, 6 mm. long, not dehiscing through septum-apex.

Moist banks and fields, Upper Sonoran and Transition Zones; Del Norte County to Santa Clara County, California. Type locality: Belmont, San Mateo County, California. April–May.

57. *Mimulus guttatus* Fischer. Common Large Monkey-flower. Fig. 4577.

Mimulus guttatus Fischer ex DC. Cat. Hort. Monsp. 127. 1813.

Mimulus guttatus var. *grandis* Greene, Man. Bay Reg. 277. 1894.

Mimulus Langsdorffii Donn ex Greene, Journ. Bot. Brit. & For. 33: 6. 1895.

Mimulus Langsdorffii var. *guttatus* Jepson, Fl. W. Mid. Calif. 406. (April) 1901.

Mimulus grandiflorus Howell, Fl. N.W. Amer. 520. (November) 1901.

Mimulus equinus Greene, Leaflets Bot. Obs. 1: 189. 1906.

Annual or perhaps sometimes biennial herb, glabrous below the finely glandular-pubescent inflorescence, the stems erect or decumbent, 4–10 dm. tall, sometimes stoloniferous. Leaf-blades oval, rounded, sinuately denticulate or sometimes pinnatifid-dentate at base, 1.5–9 cm. long, the lower rounded to petioles sometimes longer than blades, the upper sessile; pedicels becoming 20–60 mm. long; calyx becoming 18–22 mm. long, strongly plicate-angled, its lobes acute, the lower shorter, the lowest pair eventually upcurved toward the uppermost lobe which is 4–6 mm. long; corolla 30–45 mm. long, yellow, its throat ventrally with 2 large hairy brown-spotted ridges that join distally into a palate nearly or quite closing the orifice, the lower lip longer and with deflexed-spreading lobes; anthers glabrous; stigmas fimbriolate; capsule stiped, 10–12 mm. long, not dehiscing through septum-apex.

Along streams and elsewhere in wet places, Lower Sonoran Zone to Transition Zones; Alaska to southern California. Type locality: Unalaska, Alaska. March–Aug.

Mimulus guttatus subsp. *litoralis* Pennell, Proc. Acad. Phila. 99: 165. 1947. Plants usually stouter, distally more softly pubescent, especially on calyces; leaf-blades wider, as wide as or wider than long and cordate; corolla 30–45 mm. long, relatively wide. Beaches and bluffs, on or near the coast, Transition Zones; Lincoln County, Oregon, to San Mateo County, California. Type locality: beach near Otter Rock, Lincoln County, Oregon.

Mimulus guttatus var. *puberulus* (Greene) Grant, Ann. Mo. Bot. Gard. 11: 170. 1925. (*Mimulus hirsutus* Howell, Fl. N.W. Amer. 520. 1901; *M. paniculatus* Greene, Leaflets Bot. Obs. 1: 190. 1906; *M. puberulus* Greene ex Rydb. Fl. Colo. 311. 1906; *M. procerus* Greene, Leaflets Bot. Obs. 2: 6. 1909; *M. petiolaris* Greene, op. cit. 7.) Plant distally often more strongly glandular-pubescent; leaf-blades elliptic-oblong to oval, 1 to 2 times as long as wide; corolla 20–30 mm. long; fruiting calyx 13–18 (–20) mm. long. Along streams and elsewhere in wet places, Upper Sonoran and Transition Zones; British Columbia to northern Lower California, east to Montana, South Dakota, Colorado, New Mexico, and Chihuahua, the prevalent inland plant. Type locality: Pagosa Springs, Colorado.

Mimulus guttatus subsp. *Scouleri* (Hook.) Pennell, Proc. Acad. Phila. 99: 166. 1947. (*Mimulus Scouleri* Hook. Fl. Bor. Amer. 2: 100. 1838.) Stem 6–8 dm. tall, freely stoloniferous; leaf-blades nearly oblong; corolla about 25 mm. long; fruiting calyx 13–14 mm. long. Wet soil, Transition Zones; along lower Columbia River in Clatsop County, Oregon. Type locality: Columbia River. Inadequately known.

Mimulus guttatus subsp. *arenicola* Pennell, Proc. Acad. Phila. 99: 166. 1947. Plant low, 0.5–2 dm. tall, much-branched, the inflorescence less pubescent; leaf-blades small, 1–2 cm. long; corolla 25–35 mm. long. Wet sandy beach and hollows among dunes, Transition Zones; Monterey County, California. Type locality: Pacific Grove, Monterey County. June–July.

58. *Mimulus laxus* Pennell. Weak-stemmed Large Monkey-flower. Fig. 4578.

Mimulus laxus Pennell ex M. E. Peck, Man. Pl. Oregon 655. 1941.

Annual herb, glabrous below the finely glandular-pubescent inflorescence, the stems erect, 2–4 dm. tall, often somewhat stoloniferous. Leaf-blades ovate-oval to circular, rounded or obtuse, irregularly denticulate, proximally cordate and usually with slender deflexed lobes, 1–3 cm. long, the lower on petioles often longer than blades, the upper sessile; pedicels becoming 1–3.5 cm. long; calyx becoming 10–15 mm. long, strongly plicate-angled, its lobes acute, the lower shorter, the lowest pair eventually upcurved toward the uppermost lobe which is 1–3 mm. long; corolla 18–25 mm. long, yellow, its throat ventrally with 2 large hairy brown-spotted ridges that join distally into a deeper yellow palate nearly closing the orifice, the lower lip longer and with deflexed-spreading lobes; anthers glabrous; stigmas fimbriolate; capsule stiped, 6 mm. long, not dehiscing through septum-apex.

Gravelly shores and rock ledges, Transition Zones; western Washington to central California. Type locality: Elk Lake, Deschutes County, Oregon. June–July.

59. *Mimulus platycalyx* Pennell. Wide-calyxed Monkey-flower. Fig. 4579.

Mimulus platycalyx Pennell, Proc. Acad. Phila. 99: 167. 1947.

Annual herb, glabrous below the finely pubescent inflorescence, the stem erect, 0.3–1.3 dm. tall. Leaf-blades orbicular-ovate, acute or acutish, sinuately dentate, palmately 5-veined, 0.8–1.2 cm. long, slightly cordate to petioles shorter than blades, the upper sessile; pedicels becoming 10–15 mm. long, finely glandular-pilose; calyx becoming 9–14 mm. long, strongly plicate-angled, much-distended about fruit, its lobes acute, the 4 lower lobes very short and the lowest pair upcurved at tip, the uppermost prominent, at least 2 mm. the longest; corolla 20 mm. long, yellow, its throat ventrally deeper yellow and brown-spotted, with 2 large densely pubescent ridges that join distally into a palate nearly closing orifice, the lower lip longer and with deflexed-spreading lobes; anthers glabrous; stigmas finely fimbriate; capsule stipitate, not seen fully mature.

Moist granitic soil, Transition Zones; southern Sierra Nevada from Mariposa County to Tulare County, California. Type locality: Wawona, Mariposa County, California. May–Aug.

60. *Mimulus cordatus* Greene. Pale-fruited Monkey-flower. Fig. 4580.

Mimulus cordatus Greene, Leaflets Bot. Obs. 2: 5. 1909.

Annual or biennial herb, glabrous below the finely glandular-pubescent inflorescence, the stems erect or ascending, 2–8 dm. or more tall. Leaf-blades ovate to oval, rounded, sinuately denticulate, 5–7-veined, 2–8 cm. long, the lower rounded or cordate to petioles as long as or longer than blades; pedicels becoming 5–30 mm. long; calyx becoming 11–14 mm. long, strongly



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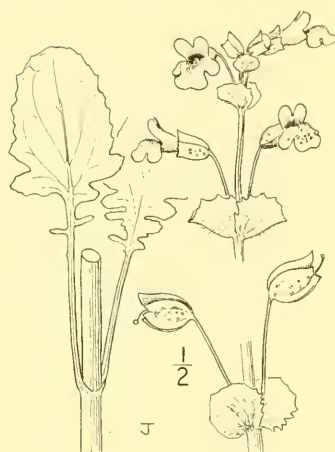
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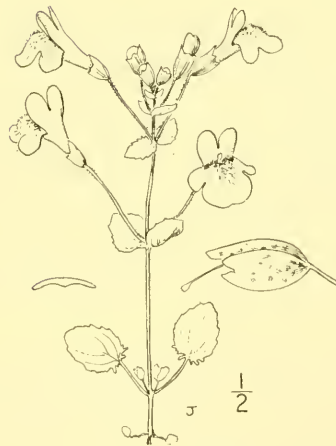
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4571. *Mimulus tilingii*
 4572. *Mimulus microphyllus*
 4573. *Mimulus clementinus*

4574. *Mimulus lyratus*
 4575. *Mimulus micranthus*
 4576. *Mimulus arvensis*

4577. *Mimulus guttatus*
 4578. *Mimulus laxus*
 4579. *Mimulus platycalyx*

plicate-angled, its lobes acute, the lower shorter, the lowest pair eventually upcurved toward the uppermost lobe which is 1.5–2 mm. long; corolla 12–15 mm. long, yellow, its throat ventrally with 2 raised hirsute and slightly brown-spotted ridges, that join distally into palate nearly or quite closing orifice, upper lip with ascending-erect lobes, the lower lip longer and with deflexed-spreading lobes; anthers glabrous; stigmas erose-fimbriolate; capsule stiped, 6 mm. long, not dehiscent through septum-apex.

Wet springy places, and along stream courses, Lower Sonoran Zone; southern California and northern Lower California, east to southern New Mexico. Type locality: Bear Mountain, near Silver City, New Mexico. March–June.

61. *Mimulus lóngulus* Greene. Delicate Monkey-flower. Fig. 4581.

Mimulus longulus Greene, Leaflets Bot. Obs. 2: 4. 1909.

Mimulus Hallii var. *alvordensis* Pennell ex M. E. Peck, Man. Pl. Oregon 655. 1941.

Annual glabrescent or glabrous herb, the stem erect or ascending, 0.5–3 dm. tall, simple or slightly branched. Leaf-blades ovate to oval or orbicular, denticulate to nearly entire, palmately 3–5-veined, 0.7–1.5 cm. long, the lower on petioles shorter than blades, the upper rounded to sessile bases; pedicels becoming 5–20 mm. long, sparsely glandular-puberulent to pubescent with glandless hairs; calyx becoming 7–9 mm. long, strongly plicate-angled, its lobes acute, the lower shorter, the lowest pair upcurving toward the uppermost lobe which is about 1.5 mm. long; corolla 5–10 mm. long, yellow, its throat ventrally pubescent and slightly brown-spotted, the feebly developed palate not closing the orifice; anthers glabrous; capsule 4 mm. long, not dehiscent through septum-apex.

Moist gravelly or stony soil, Transition Zones; Columbia Plateau of eastern Washington and Oregon, eastward and southward to Montana, Utah, and Arizona. Type locality: Deeth, Nevada. July–Aug.

62. *Mimulus glaucéscens* Greene. Shield-bracted Monkey-flower. Fig. 4582.

Mimulus glaucescens Greene, Bull. Calif. Acad. 1: 113. 1885.

Annual herb, glabrous and glaucous, the stem erect, 3–6 dm. tall. Leaf-blades widely ovate or nearly circular, denticulate to dentate, palmately veined, the lower cordate to petioles about equaling the blades in length, the upper sessile, the bracts so widely connate and rounded as together to appear circular; pedicels becoming 10–30 mm. long; calyx becoming 12–18 mm. long, strongly plicate-ridged, its teeth acute, the lower much shorter, the lowest pair upcurved to 90° toward the uppermost lobe, which is upcurved-projecting; corolla 25–40 mm. long, yellow, its throat ventrally deeper yellow and with carmine spots and sometimes a median blotch, with 2 strongly developed and densely hairy ridges that join distally to form a palate that closes orifice, upper lip ascending, lower lip longer with deflexed lobes; anthers sparsely hairy; stigmas fimbriate; capsule shortly stipitate, 10–15 mm. long, not dehiscent through septum-apex.

Wet sand or black loam, Lower Sonoran Zone; middle Sacramento Valley in Butte and Tehama Counties, northern California. Type locality: Butte County, California. March–May.

63. *Mimulus Brèweri* (Greene) Coville. Brewer's Monkey-flower. Fig. 4583.

Eumnanus Breweri Greene, Bull. Calif. Acad. 1: 101. 1885.

Mimulus Breweri Coville, Contr. U.S. Nat. Herb. 4: 171. 1893.

Mimulus rubellus var. *Breweri* Jepson, Man. Fl. Pl. Calif. 927. 1925.

Annual glandular-pubescent herb, the stems erect, 0.2–1.8 dm. tall. Leaf-blades linear-lanceolate to lanceolate (or the lowest oblanceolate), slightly denticulate to entire, obscurely longitudinally veined, 0.5–3 cm. long, narrowed to sessile bases; pedicels becoming 3–12 mm. long; calyx 5–7 mm. long, with 5 glandular-pubescent ridges, its lobes 1 mm. long, triangular-acute; corolla 5–6 mm. long, purple, its throat narrow, ventrally with 2 low finely pubescent yellow ridges, its lobes spreading, nearly alike, retuse to shallowly notched, magenta at base (so forming a dark purple ring around the open orifice); anthers glabrous; stigmas very unequal, the upper rudimentary, the lower recurved and effecting self-pollination by the eventual adherence of the anthers; capsule 5–6 mm. long, dehiscent slightly through septum-apex.

Moist or desiccated sandy soil and rock ledges. Transition Zones to Hudsonian Zone; Washington and western Montana, south to northern California and western Nevada, thence through the Sierra Nevada to Tulare County, central California. Type locality: Donner Lake, California. June–Aug.

64. *Mimulus Clevelandii* Brandg. Cleveland's Monkey-flower. Fig. 4584.

Mimulus Clevelandii Brandg. Gard. & Forest 8: 134. 1895.

Diplacus Clevelandii Greene, Erythra 4: 22. 1896.

Plant glandular-pubescent, woody and branched at base, the stems herbaceous, 4–5 dm. tall. Leaf-blades oblong-lanceolate, crenate to dentate, lower 4–7 cm. long, cuneately narrowed to sessile or slightly petioled bases, the upper clasping; pedicels 3–4 mm. long; calyx in anthesis 20–24 mm. long, becoming ridge-angled, its lobes lanceolate, 6–9 mm. long, the uppermost slightly the longest; corolla 35–40 mm. long, yellow, externally glandular-pubescent, its throat narrowly campanulate, internally nearly glabrous and ventrally 2-ridged, its lobes rounded; anthers glabrous; stigmas unequal, ciliate; capsule 9–11 mm. long.

Dry mountains. Upper Sonoran Zone; Riverside County to San Diego County, southern California. Type locality: Cuyamaca Peak, San Diego County. May–July.

65. *Mimulus longiflorus* (Nutt.) Grant. Salmon Bush Monkey-flower. Fig. 4585.

Diplacus longiflorus Nutt. Bot. Mag. 65: pl. 3655. 1838.

Mimulus glutinosus var. *brachypus* A. Gray, Bot. Calif. 1: 566. 1876.

Mimulus longiflorus Grant, Gentes Herb. 1: 136. 1923.

Plant glutinous and also pubescent on stems, pedicels, calyces, and lower leaf-surfaces, much-branched, 3–9 dm. tall or more, the stems extensively woody. Leaf-blades lanceolate or oblanceolate, serrulate to entire, plane or revolute-margined, 4–8 cm. long, glutinous-pubescent, beneath slightly paler and pubescent with mostly simple hairs, narrowing to sessile bases; pedicels 2–7 mm. long; calyx 25–35 mm. long, ridge-angled, its tube inflated, its lobes linear-lanceolate, the uppermost 7–9 mm. long, about twice as long as the others; corolla 50–60 mm. long, orange-yellow, externally glandular or glutinous, internally glabrous, its throat campanulate-funnelform and about as long as the narrow tube, ventrally with 2 low orange ridges, its lobes rounded; anthers glabrous; stigmas equal or nearly so, ciliolate; capsule 15 mm. long, dehiscent throughout and splitting septum to base.

Rocky canyons and chaparral, Upper Sonoran Zone; southern California from Kern and San Luis Obispo Counties, southern California, to northern Lower California. Type locality: near Santa Barbara, California. March–July.

Mimulus longiflorus var. *calycinus* (Eastw.) Grant, Ann. Mo. Bot. Gard. 11: 331. 1925. (*Diplacus speciosus* Davy, Erythea 2: 101. 1894; *D. calycinus* Eastw. Bot. Gaz. 41: 287. 1906.) Leaf-blades elliptic-oblong; calyx-tube more abruptly and strongly inflated distally; inflorescence usually more villose; corolla 55–65 mm. long, buff yellow. Rocky slopes, Upper Sonoran and Transition Zones; southern Sierra Nevada from Fresno County to Kern County, California. Type locality: South Fork of Kaweah River, Tulare County, California. April–July.

66. *Mimulus aurantiacus* Curtis. Orange Bush Monkey-flower. Fig. 4586.

Mimulus aurantiacus Curtis, Bot. Mag. 10: pl. 354. 1796.

Mimulus glutinosus Wendl. Bot. Beobacht. 51. 1798.

Diplacus latifolius Nutt. Bot. Mag. 65: under pl. 3655. 1838.

Diplacus leptanthus Nutt. loc. cit.

Diplacus glutinosus Nutt. Ann. Mag. Nat. Hist. 1: 138. 1838.

Diplacus aurantiacus Jepson, Man. Fl. Pl. Calif. 919. 1925.

Plant glutinous, and also finely glandular-pubescent on stems, pedicels, calyces, and ribs of lower leaf-surfaces, much-branched, 6–12 dm. tall, the stems extensively woody. Leaf-blades oblong or lance-oblong, serrate, 3–7 cm. long, beneath slightly paler and finely pilose with stellate hairs, narrowing to sessile bases; pedicels 7–15(–25) mm. long; calyx 20–25 mm. long, its tube ridged, distally slightly inflated and somewhat wing-angled, its lobes lanceolate, the uppermost 7 mm. long, about twice as long as the others; corolla 35–45(–50) mm. long, orange, externally glutinous, its throat campanulate-funnelform and about as long as the narrow tube, ventrally puberulent and with 2 low orange ridges, its lobes rounded or erose; anthers glabrous; stigmas fimbriolate, somewhat unequal; capsule 20 mm. long, dehiscent throughout and splitting septum to base.

Open places, especially rocky, Upper Sonoran and Transition Zones; from Curry County, southwestern Oregon, south to Santa Barbara County, southern California, inland to the base of the Sierra Nevada from Placer County to Tuolumne County, California. Type locality: probably San Francisco or Monterey, California. March–Aug.

67. *Mimulus linearis* Benth. Narrow-leaved Bush Monkey-flower. Fig. 4587.

Mimulus linearis Benth. Scroph. Indicae 27. 1835.

Mimulus glutinosus var. *linearis* A. Gray, Bot. Calif. 1: 566. 1876.

Diplacus linearis Greene, Pittonia 2: 156. 1890.

Mimulus longiflorus var. *linearis* Grant, Ann. Mo. Bot. Gard. 11: 334. 1925.

Diplacus longiflorus var. *linearis* McMinn, Ill. Man. Calif. Shrubs 498. 1939.

Plant glutinous, and also finely puberulent on stems and pedicels, 4–8 dm. tall, the stems extensively woody. Leaf-blades oblong- to linear-lanceolate, obscurely serrulate, usually so revolute as to appear entire, 2.5–7 cm. long, beneath slightly paler and finely stellate-pubescent or glabrescent, narrowing to sessile bases; pedicels 5–9 mm. long; calyx 20–25 mm. long, its tube ridge-angled, distally scarcely wider, its lobes lance-linear, the uppermost 7–9 mm. long, about one and a half times as long as the others; corolla 40–50 mm. long, pale yellow, externally somewhat glutinous, internally glabrous, its throat campanulate-funnelform and about as long as the narrow tube, ventrally with 2 low pale orange ridges, its lobes truncate to incised-lobed (less than one-fourth length); anthers glabrous; stigmas equal, fimbriolate; capsule 20–22 mm. long, dehiscent throughout and splitting septum to base.

Rocky chaparral and canyons, Upper Sonoran Zone; near coast, from Ventura County, California, to northern Lower California. Type locality: California. April–June.

Hybridizes freely with *Mimulus puniceus*.

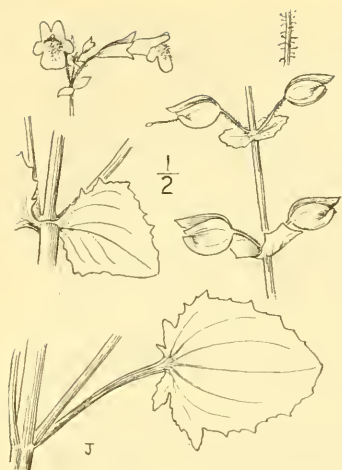
68. *Mimulus bifidus* Pennell. Notch-petaled Bush Monkey-flower. Fig. 4588.

Diplacus glutinosus var. *grandiflorus* Lindl. & Paxt. Fl. Gard. 3: 95. 1853.

Diplacus grandiflorus Groenl. Rev. Hort. IV. 6: 402. 1857.

Mimulus bifidus Pennell, Proc. Acad. Phila. 99: 168. 1947.

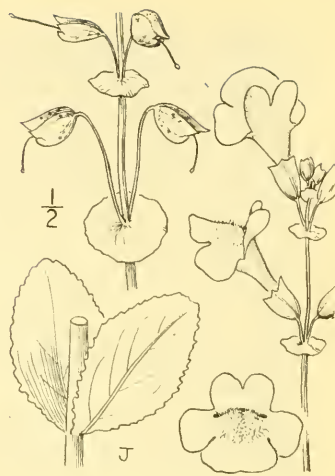
Plant glutinous, and also puberulent on stems, pedicels, and veins of leaves, the woody stems spreading from base, the herbaceous branches ascending or erect. Leaf-blades elliptic-oblong, serrulate, often revolute and seemingly entire, 3–4.5 cm. long, beneath slightly paler and glabrous though glutinous, cuneately narrowed to sessile bases. Pedicels 8–15 mm. long;



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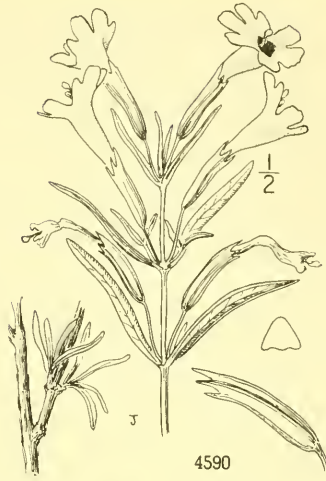
4580. *Mimulus cordatus*
 4581. *Mimulus longulus*
 4582. *Mimulus glaucescens*

4583. *Mimulus Breweri*
 4584. *Mimulus Clevelandii*
 4585. *Mimulus longiflorus*

4586. *Mimulus aurantiacus*
 4587. *Mimulus linearis*
 4588. *Mimulus bifidus*



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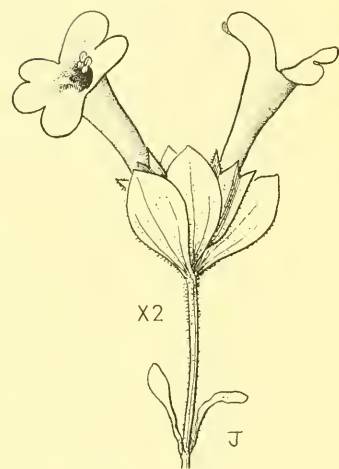
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4589. *Mimulus aridus*
 4590. *Mimulus puniceus*
 4591. *Mimulus Flemingii*

4592. *Mimulus clivicola*
 4593. *Mimulus Cusickii*
 4594. *Mimulus microphyton*

4595. *Mimulus nanus*
 4596. *Mimulus Jepsonii*
 4597. *Mimulus mephiticus*

calyx 25–30 mm. long, ridge-angled, narrow near base but mostly slightly cylindric-expanded, its lobes attenuate-tipped, the uppermost 8–10 mm. long, about one and a half times as long as the others; corolla 55–65 mm. long, pale yellow, externally slightly glutinous, its throat campanulate, nearly as long as and abruptly widened from the narrow tube, ventrally minutely puberulent and with 2 low ochraceous-orange ridges, its lobes strongly bifid (one-fourth to one-half their depth); anthers glabrous; capsule 16–17 mm. long, dehiscing throughout and splitting septum to base.

Rocky canyons and open slopes, Upper Sonoran Zone; lower slopes of Sierra Nevada, Plumas County to Yuba County, California. Type locality: not stated. April–June.

Mimulus bifidus subsp. *fasciculatus* Pennell, Proc. Acad. Phila. 99: 168. 1947. (*Diaplacus grandiflorus* Greene, Pittonia 2: 156. 1890.) Leaves and bracts narrower, linear-oblong, only 3–5 mm. (instead of 8–15 mm.) wide; corolla 50 mm. long; plant lower and more spreading. Rocky hills, Upper Sonoran Zone; Santa Lucia Mountains, Monterey County, California. Type locality: Santa Lucia Park, Arroyo Seco, Monterey County. May.

69. *Mimulus áridus* (Abrams) Grant. Low Bush Monkey-flower. Fig. 4589.

Diaplacus aridus Abrams, Bull. Torrey Club 32: 540. 1905.

Mimulus aridus Grant, Ann. Mo. Bot. Gard. 11: 336. 1925.

Plant glutinous, and also obscurely puberulent on stems and pedicels, much-branched from base, 2–4 dm. tall, the stems woody. Leaf-blades elliptic-lanceolate, dentate to denticulate-serrate, plane, 4–6 cm. long, beneath slightly paler and glabrous though glandular-dotted, narrowing to sessile or slightly petioled bases; pedicels 5–7 mm. long; calyx 35–40 mm. long, proximally narrow and ridged, distally campanulately inflated and wing-angled, its lobes attenuate-tipped, the uppermost 8–10 mm. long, about one and a half times as long as the others; corolla 50 mm. long, yellow, externally glutinous, internally glabrous, its throat campanulate, about half the length of and abruptly widened from the narrow tube, ventrally with 2 low deep yellow ridges, its lobes rounded or slightly emarginate; anthers glabrous; stigmas unequal, fimbriolate.

Open rocky places, Upper Sonoran Zone; San Diego County, southern California. Type locality: Jacumba, San Diego County. April–June.

70. *Mimulus puniceus* (Nutt.) Steudel. Red Bush Monkey-flower. Fig. 4590.

Diaplacus puniceus Nutt. Bot. Mag. 65: pl. 3655. 1838.

Mimulus puniceus Steudel, Nom. ed. 2: 2: 150. 1841.

Diaplacus glutinosus var. *puniceus* Benth. in A. DC. Prod. 10: 368. 1846.

Mimulus glutinosus var. *puniceus* A. Gray, Bot. Calif. 1: 566. 1876.

Plant glutinous, and also puberulent on stems, pedicels, and leaves, the stems extensively woody and much-branched, erect or ascending, 6–15 dm. tall. Leaf-blades lanceolate, entire or the lower undulate-serrulate, 3–10 cm. long, beneath slightly paler and stellate-pubescent, attenuate-narrowed to sessile bases; pedicels 10–25 mm. long; calyx 20–25 mm. long, ridge-angled or somewhat plicate, distally slightly wider, its lobes linear, the uppermost 6–8 mm. long, about twice as long as the others; corolla 35–45 mm. long, red (its limb scarlet-red to salmon-orange or carmine), externally puberulent and somewhat glutinous, internally glabrous, its throat narrowly campanulate, about one and a half times as long as the narrow tube, ventrally with 2 narrow orange (to flame-scarlet) ridges, its lobes truncate, emarginate and slightly lobate; anthers glabrous; stigmas somewhat unequal, ciliolate; capsule about 20 mm. long, dehiscing throughout and splitting septum to base.

Chaparral, usually rocky, Upper Sonoran Zone; Santa Catalina Island and coastal territory, Los Angeles County, California, to northern Lower California. Type locality: San Diego, California. Feb.–June.

71. *Mimulus Flemingii* Munz. Channel Islands Bush Monkey-flower. Fig. 4591.

Diaplacus parviflorus Greene, Pittonia 1: 36. 1887.

Mimulus parviflorus Grant, Ann. Mo. Bot. Gard. 11: 344. 1925. Not Lindl. 1825.

Mimulus Flemingii Munz, Man. S. Calif. 477. 1935.

Plant glutinous, and also puberulent on stems, pedicels, and leaves, the stems extensively woody and much-branched, erect or diffuse, 1–8 dm. tall. Leaf-blades ovate-oblong, denticulate to entire, 3–7 cm. long, beneath slightly paler and glabrous, cuneately narrowed to sessile bases; pedicels 8–20 mm. long; calyx 20–23 mm. long, ridge-angled, distally scarcely wider, its lobes linear, the uppermost 6–7 mm. long, about one and a half times the length of the others; corolla 30–40 mm. long, decurved, red (its limb vermilion-scarlet), its throat cylindric-campanulate, about as long as the narrow tube, internally orange-chrome, its lobes rounded or retuse; anthers glabrous, slightly exserted; stigmas equal or nearly so, fimbriolate; capsule 13–15 mm. long, not seen mature.

Canyons and bluffs, Upper Sonoran Zone; Channel Islands (Santa Rosa, Santa Cruz and Anacapa), southern California. Type locality: Santa Cruz Island, California. March–July.

72. *Mimulus clivícola* Greenm. Bank Monkey-flower. Fig. 4592.

Mimulus clivícola Greenm. Erythea 7: 119. 1899.

Eunnanus clivícola Heller, Muhlenbergia 1: 60. 1904.

Annual glandular-pubescent herb, the stems erect, 0.5–1.5 dm. tall. Leaf-blades narrowly elliptic, distally denticulate to dentate, cuneate to sessile bases; pedicels 3–10 mm. long, much shorter than subtending leaves; calyx becoming 7–10 mm. long, wing-angled and somewhat plicate, its lobes nearly equal, triangular-acuminate, nearly 2 mm. long; corolla 15–20 mm. long, purple, internally ventrally yellowish, pubescent, 2-ridged, its lobes rounded, nearly equal;

anthers glabrous; stigmas equal, ciliolate; capsule 8–9 mm. long, upcurved and distally exerted, dehiscent much farther dorsally and splitting septum to base.

Banks and gulches, Upper Sonoran Zone; Snake River valley of eastern Oregon and adjacent Idaho. Type locality; near South Clearwater, Idaho. May–July.

73. *Mimulus Cusickii* (Greene) Piper. Cusick's Monkey-flower. Fig. 4593.

Mimulus Bigelovii var. *ovatus* A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 445. 1886.

Eunanus Cusickii Greene, Pittonia 1: 36. 1887.

Mimulus Cusickii Piper, Contr. U.S. Nat. Herb. 11: 508. 1906.

Annual herb, glandular-pubescent or -puberulent, with aromatic odor, the stems erect, 0.5–3 dm. tall. Leaf-blades elliptic or oblanceolate, acute to usually acuminate or cuspidate, entire, longitudinally veined, cuneate to sessile bases; pedicels 1–3 mm. long, much shorter than the wide subtending leaves; calyx becoming 10–12 mm. long, wing-angled and somewhat plicate, its lobes slightly unequal, ovate-acuminate to -cuspidate, 2–3 mm. long; corolla 20–30 mm. long, purple, internally ventrally with 2 ridges, on and between which densely pubescent and yellow margined by deep (rhodamine-)purple, and with short rods of this color, its lobes rounded to truncate; anthers glabrous or nearly so; stigmas equal, ciliolate; capsule 11–13 mm. long, upcurved and distally exerted, dehiscent throughout dorsally and splitting septum to base.

Sandy and rocky slopes, Transition Zones; interior plateau of Oregon and western Idaho. Type locality: Malheur River, southeastern Oregon. May–Sept.

74. *Mimulus microphyton* Pennell. Tiny Purple Monkey-flower. Fig. 4594.

Mimulus microphyton Pennell, Proc. Acad. Phila. 99: 169. 1947.

Annual herb, minutely pubescent, the glandular-pubescent stems erect, 1–2 cm. tall. Leaf-blades elliptic, obtuse to rounded, entire, longitudinally veined, narrowed to sessile bases; pedicels 1–2 mm. long; calyx in anthesis 5–6 mm. long, wing-angled and somewhat plicate. Corolla 10–13 mm. long, purple, internally ventrally somewhat pubescent, slightly dark-spotted, and with 2 low yellow ridges, its lobes rounded to truncate; anthers ciliate; stigmas equal, ciliolate.

Wet banks, Transition Zones; Columbia River valley east of the Cascade Range in central Washington. Type locality: Tumwater Canyon, near Leavenworth, Chelan County, Washington. May–June.

75. *Mimulus nanus* Hook. & Arn. Dwarf Purple Monkey-flower. Fig. 4595.

Mimulus nanus Hook. & Arn. Bot. Beechey 378. 1838.

Eunanus Tolmiei Benth. in A. DC. Prod. 10: 374. 1846.

Eunanus Austinae Greene, Pittonia 1: 36. 1887.

Eunanus nanus Holz. Contr. U.S. Nat. Herb. 3: 244. 1895.

Mimulus Tolmiei Rydb. Mem. N.Y. Bot. Gard. 1: 351. 1900.

Mimulus Austinae Grant, Ann. Mo. Bot. Gard. 11: 296. 1925.

Annual herb, minutely glandular-pubescent, the stems erect, 1–12 cm. tall. Leaf-blades elliptic-oblanceolate, obtuse or rounded, entire, obscurely longitudinally veined, cuneate-attenuate to sessile (or lower slightly petioled) bases; pedicels becoming 2–4 mm. long; calyx becoming 7–9 mm. long, obscurely to evidently ridge-angled, its lobes equal or uppermost slightly the longest, triangular-ovate to -acuminate, 2 mm. long; corolla 13–20 mm. long, purple (or very rarely yellow), internally ventrally finely pubescent and with 2 yellow ridges, between and on which mottled or spotted with deep purple, its lobes spreading, the upper pair larger; anthers minutely pubescent or glabrescent; stigmas equal, glandular-ciliolate; capsule 7–11 mm. long, dehiscent throughout dorsally and splitting septum to base.

Gravelly or sandy soil, often on pumice, Upper Sonoran and Transition Zones; southern Washington to northern California, east to Yellowstone Park and northeastern Nevada. Type locality: southern Idaho. May–July.

76. *Mimulus Jepsonii* Grant. Jepson's Monkey-flower. Fig. 4596.

Mimulus Jepsonii Grant, Ann. Mo. Bot. Gard. 11: 306. 1925.

Mimulus microcarpus Pennell, Notulae Naturae No. 71: 1. 1941.

Annual minutely glandular-pubescent herb, the erect stems 1–10 cm. tall. Leaves remotely placed or distally clustered, their blades oblong- to linear-lanceolate, obtuse, entire, obscurely longitudinally veined, attenuate to slightly petioled bases; pedicels 1–2 mm. long; calyx becoming 4–5 mm. long, ridge-angled (angles green and pubescent, with intervening surface pale and nearly glabrous), its lobes ovate- to lance-acuminate, 1.5–2 mm. long; corolla 9–12 mm. long, dull purple, internally pilose on lips (especially lower) and ventrally with 2 yellow ridges (yellow with dark purple spots and similar margins); anthers glabrous; stigmas equal or nearly so, ciliolate; capsule 4.5–5.5 mm. long.

Bare gravelly or sandy soil in coniferous forest, Canadian Zone; Cascade Mountains from Douglas County, southern Oregon, to Lassen County, northern California. Type locality: Twin Lakes, Lassen County, California. June–Aug.

77. *Mimulus mephiticus* Greene. Skunky Monkey-flower. Fig. 4597.

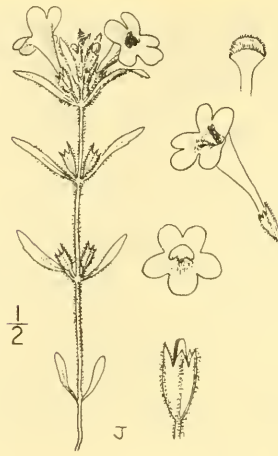
Mimulus mephiticus Greene, Bull. Calif. Acad. 1(1): 9. 1884.

Eunanus mephiticus Greene, op. cit. 102. 1885.

Annual herb, coarsely glandular-pubescent with a strong mephitic odor, the stems erect, 2–10 cm. long. Leaf-blades oblanceolate to linear-oblanceolate, obtuse, entire, longitudinally veined,



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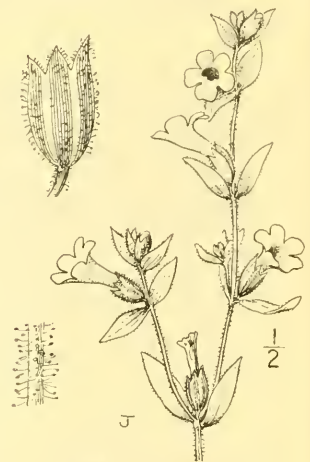
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4598. *Mimulus densus*
4599. *Mimulus coccineus*
4600. *Mimulus Johnstonii*

4601. *Mimulus Whitneyi*
4602. *Mimulus leptaleus*
4603. *Mimulus Fremontii*

4604. *Mimulus constrictus*
4605. *Mimulus Layneae*
4606. *Mimulus viscidus*

attenuate to sessile bases; pedicels 1–5 mm. long; calyx becoming 7 mm. long, ridge-angled, its lobes equal or nearly so, acute to attenuate, about 2 mm. long; corolla 12–16 mm. long, yellow, or sometimes purple, internally ventrally loosely pilose, with 2 ridges and with conspicuous brown spots, its lobes rounded; anthers minutely pubescent; stigmas nearly equal, ciliolate; capsule 6–8 mm. long, dehiscing throughout both dorsally and ventrally, and splitting septum to base.

Sandy granitic soil, Canadian and Hudsonian Zones; Sierra Nevada from Sierra County to Mariposa County, California. Type locality: Cloud's Rest, Yosemite, California. June–Aug.

78. *Mimulus densus* Grant. Yellow-and-Purple Monkey-flower. Fig. 4598.

Mimulus densus Grant, Ann. Mo. Bot. Gard. 11: 298. 1925.

Annual glandular-pubescent, the stems erect, 0.5–1.2 dm. tall. Leaf-blades oblanceolate or lanceolate, obtuse, entire, obscurely longitudinally veined, attenuate to sessile bases; pedicels 1–4 mm. long; calyx becoming 7–9 mm. long, ridge- to slightly wing-angled (angles green and hirsute-pubescent, with intervening surface pale or scarious), its lobes slightly unequal, lanceolate or somewhat attenuate, the uppermost 3–3.5 mm. long; corolla 15–20 mm. long, yellow or purple (on different plants, but frequently in same colony), internally ventrally pilose or pubescent, dark-spotted and -lined, with 2 shallow ridges; anthers finely pubescent; stigmas equal or nearly so, finely ciliate; capsule 7–10 mm. long, dehiscing throughout both dorsally and ventrally, and also splitting septum to base.

Gravelly or rocky soil, among sagebrush or juniper-piñon, Transition Zones; eastern slope of the Sierra Nevada from Lassen County to Mono County, California, eastward on ranges of Great Basin in Nevada. Type locality: near Austin, Lander County, Nevada. May–July.

79. *Mimulus coccineus* Congdon. Sierra Monkey-flower. Fig. 4599.

Mimulus coccineus Congdon, Erythra 7: 187. 1900.

Mimulus stamineus Grant, Ann. Mo. Bot. Gard. 11: 302. 1925.

Mimulus Wolfii Eastw. Leaflets West. Bot. 1: 44. 1933.

Annual glandular-pubescent herb, strong-scented, the stems erect, 0.5–18 cm. tall. Leaf-blades lanceolate or elliptic-lanceolate, obtuse, entire, longitudinally veined, attenuate to sessile bases; pedicels 1–3 mm. long; calyx becoming 4–8 mm. long, ridge-angled (between ridges pale or scarious), its lobes attenuate, 1.5–3 mm. long; corolla 12–20 mm. long, purple, internally dorsally dark purple within upper lip, ventrally pubescent and with 2 bright yellow ridges on and between which are many conspicuous dark purple spots, its lobes rounded; anthers finely pubescent; stigmas ciliolate, the lower slightly the larger; capsule 7–8 mm. long, dehiscing throughout both dorsally and ventrally, and splitting septum to base.

Sandy or gravelly soil, Transition Zones to Alpine Zone; Sierra Nevada from Alpine County to Tulare and Inyo Counties, California. Type locality: summits of the Sierra Nevada, east of the Minarets, California. June–Aug.

80. *Mimulus Johnstonii* Grant. Johnston's Monkey-flower. Fig. 4600.

Mimulus Johnstonii Grant, Ann. Mo. Bot. Gard. 11: 280. 1925.

Annual glandular-pubescent herb, the stems erect, 0.5–2 dm. tall. Leaf-blades oblanceolate to obovate-spatulate, acute, entire, obscurely longitudinally veined, cuneate to shortly petiolar (or the upper sessile) bases; pedicels 1–3 mm. long; calyx becoming 8–9 mm. long, ridge-angled, intervening surface pale and less pubescent, its lobes acuminate-attenuate, the uppermost 2–4 mm. long, about twice as long as the lowermost pair; corolla 13–15 mm. long, purple, internally ventrally greenish yellow and purple-marked, and with 2 yellow pubescent ridges, its lobes rounded; anthers glabrous; stigmas ciliolate, equal or nearly so; capsule 8 mm. long, dehiscing both dorsally and ventrally, and splitting septum to base.

Gravelly soil, openings in coniferous forest, Transition Zones; San Gabriel Range, in Los Angeles and western San Bernardino Counties, southern California. Type locality: San Antonio Canyon, San Antonio Mountains, Los Angeles County. June–July.

81. *Mimulus Whitneyi* A. Gray. Varicolored Monkey-flower. Fig. 4601.

Eunanus bicolor A. Gray, Proc. Amer. Acad. 7: 381. 1868. Not *Mimulus bicolor* Hartw. 1849.

Mimulus nanus var. *bicolor* A. Gray, Bot. Calif. 1: 564. 1876.

Mimulus Whitneyi A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 445. 1886.

Annual finely glandular-pubescent herb, the stems erect, 1–6 cm. tall. Leaves few, mostly clustered at summit of stem, their blades oblanceolate or elliptic-oblanceolate, obtuse, entire, 1-veined, attenuate to sessile bases; pedicels 1–2 mm. long; calyx becoming 5–6 mm. long, faintly ridged, intervening surface pale or scarious and glabrescent, its lobes acuminate-attenuate, 2 mm. long; corolla 10–16 mm. long, either pale yellow, with maroon areas on dorsal and maroon streaking on ventral side of throat, or else purple, with similar dorsal areas but pale and with purple lines and spots on ventral side, internally ventrally hairy and with 2 low yellow ridges, its lobes rounded; anthers glabrous; stigmas ciliolate, slightly unequal; capsule 5–6 mm. long, dehiscing throughout dorsally and ventrally and splitting septum to base.

Gravelly soil, openings in coniferous forest, Canadian and Hudsonian Zones; southern Sierra Nevada of Fresno and Tulare Counties, California. Type locality: Fresno County, California. June–Aug.

82. *Mimulus leptaleus* A. Gray. Least-flowered Monkey-flower. Fig. 4602.

Mimulus leptaleus A. Gray, Proc. Amer. Acad. 11: 96. 1876.

Eunanus leptaleus Greene, Bull. Calif. Acad. 1: 101. 1885.

Annual glandular-pubescent herb, blackening in drying, the stems erect, 1–9 cm. tall. Leaves bunched near stem-apices, their blades linear-oblongate, acutish to obtuse, entire, longitudinally veined, cuneate to sessile or slightly petioled bases; pedicels 1–2 mm. long; calyx becoming 3–4 mm. long, scarcely ridged, intervening surface pale or scarious and glabrescent, its lobes equal or nearly so, distally linear-attenuate, 1 mm. long; corolla 5–7 mm. long, purple, ventrally yellow, internally glabrous and ventrally distally white with dark purple lines and spots, its lobes occasionally also yellow, rounded, the lowermost notched; anthers glabrous; stigmas equal, lobulate-fimbriate; capsule 5 mm. long, dehiscing throughout both dorsally and ventrally and splitting septum to base.

Sandy or gravelly granitic soil, Boreal Zones; Sierra Nevada from Nevada County to Tulare County, California, and on Mount Rose in adjacent Nevada. Type locality: south of the Yosemite, in the Sierra Nevada, California. June–Aug.

83. *Mimulus Fremontii* (Benth.) A. Gray. Fremont's Monkey-flower. Fig. 4603.

Eunanus Fremontii Benth. in A. DC. Prod. 10: 374. 1846.

Mimulus Fremontii A. Gray, Bot. Calif. 1: 565. 1876.

Annual herb, glandular-pubescent, often villously so, the stems erect, 0.1–2 dm. tall. Leaf-blades oblanceolate or oblong-lanceolate, obtuse, slightly dentate to entire, longitudinally veined, cuneate to sessile bases; pedicels 2–4 mm. long; calyx becoming 8–10 mm. long, strongly wing-ridged, narrow intervening troughs pale and glabrescent, its lobes acuminate to slightly caudate, the uppermost 2–3 mm. long, the other pairs 1.5–2 mm. long; corolla 20–25 mm. long, purple, externally pubescent, internally glabrous except for minute hairs on the 2 yellow ventral ridges, its throat internally dorsally and laterally dark purple but ventrally yellow and purple-spotted, its lobes truncate-rounded and slightly retuse; anthers glabrous; stigmas equal, ciliate; capsule 8–10 mm. long, dehiscing throughout dorsally and splitting septum to base.

Sandy soil, Upper Sonoran Zone; Coast Ranges and western Mojave Desert, San Benito County to San Bernardino County, California, southward to northern Lower California. Type locality: southern California (erroneously stated as Rocky Mountains). April–June.

84. *Mimulus constrictus* (Grant) Pennell. Dense-fruited Monkey-flower.
Fig. 4604.

Mimulus subsecundus var. *constrictus* Grant, Ann. Mo. Bot. Gard. 11: 287. 1925.

Annual herb, finely glandular-pubescent and also usually minutely villose with glandless hairs, the stems erect, 0.5–3 dm. tall. Leaf-blades oblanceolate or elliptic-lanceolate, acute or acutish, entire to sinuately denticulate, longitudinally veined, long-cuneate to sessile bases; pedicels 2–4 mm. long; calyx becoming 10–12 mm. long, wing-ridged, intervening surface pale and glabrescent, its lobes caudate-attenuate, the uppermost slightly the longest, 2.5–3 mm. long; corolla 18–23 mm. long, purple, internally ventrally finely pilose distally and with 2 yellow ridges, on and between which are dark purple spots, its lobes rounded; anthers minutely pubescent; stigmas equal, ciliate; capsule 8 mm. long, dehiscing throughout dorsally and splitting septum to base.

Coarse sand, usually granitic, Transition Zones; low mountains and foothills of the southern Sierra Nevada, Inyo and Tulare Counties to Ventura County, California. Type locality: near Middle Tule River, California. May–July.

85. *Mimulus Layneae* (Greene) Jepson. Layne's Monkey-flower. Fig. 4605.

Eunanus Layneae Greene, Bull. Calif. Acad. 1: 104. 1885.

Mimulus Layneae Jepson, Fl. W. Mid. Calif. 405. 1902.

Annual glandular-pubescent herb, the stems erect, 1–2 dm. tall. Leaf-blades oblanceolate, obtuse or obtusish, slightly dentate to entire, longitudinally veined, long-cuneate to sessile bases; pedicels 1–2 mm. long; corolla 13–20 mm. long, purple, externally pubescent, internally dorsally dark purple, ventrally with 2 slightly pubescent ridges and distally white with purple spots, its rounded lobes each with deep purple median line; anthers ciliate; stigmas fimbriolate, somewhat unequal; capsule 7–9 mm. long, dehiscing throughout dorsally and splitting septum to base.

Sandy or gravelly places, Upper Sonoran and Transition Zones; in North Coast Ranges from Humboldt County to Napa County, and from Siskiyou County south along the Sierra Nevada to Fresno County, California. Type locality: Bartlett Mountain, Lake County, California. May–Aug.

86. *Mimulus viscidus* Congdon. Viscid Monkey-flower. Fig. 4606.

Mimulus viscidus Congdon, Erythra 7: 187. 1900.

Mimulus subsecundus var. *viscidus* Grant, Ann. Mo. Bot. Gard. 11: 286. (January) 1925.

Mimulus Fremontii var. *viscidus* Jepson Man. Fl. Pl. Calif. 924. (September) 1925.

Annual coarsely glandular-pubescent herb, the stems erect, 1.5–3 dm. tall. Leaf-blades narrowly elliptic, obtuse, slightly dentate to entire, pinnately veined (with lowest veins elongated), narrowed to sessile bases; pedicels 2–3 mm. long; calyx 9–12 mm. long, plicately wing-ridged with only a narrow pale and glabrescent line between the green glandular-hairy ridges, its lobes acute to acuminate, or the uppermost longest one obtuse; corolla 20–25 mm. long, purple, externally pubescent, internally dorsally and laterally white, ventrally with 2 sharp stiffly hairy

ridges, on and between which yellow, or distally white, and with many minute purple spots, its lobes rounded-emarginate, each with median dark purple line; anthers ciliate; stigmas rounded, the lower somewhat the larger; capsule 8–9 mm. long, dehiscing dorsally and distally ventrally, and splitting septum to base.

Stony limestone woodland, Upper Sonoran Zone; foothills of Sierra Nevada from Calaveras County to Tulare County, California. Type locality: presumably Mariposa County, California. May–June.

87. *Mimulus Bigelovii* A. Gray. Bigelow's Monkey-flower. Fig. 4607.

Eunanus Bigelovii A. Gray, *Pacif. R. Rep.* 4: 121. 1857.

Mimulus Bigelovii A. Gray, *Proc. Amer. Acad.* 11: 96. 1876.

Annual glandular-pubescent herb, the stem erect, 0.5–3 dm. tall. Leaf-blades lance- to ovate-elliptic, acute to somewhat acuminate, slightly (but sharply) dentate to entire, pinnately veined (with lowest veins elongated), narrowed to sessile bases; pedicels 2–5 mm. long; calyx 10–14 mm. long, wing-ridged, intervening surface paler than the glandular-hairy ridges, its lobes acuminate-attenuate, 3–4 mm. long, the uppermost longer, 5–7 mm. long; corolla 20–25 mm. long, purple, externally finely pubescent, internally so on lobes, the throat ventrally pale yellow with fine purple spots and with 2 minutely pubescent bright yellow ridges, its lobes rounded-retuse; anthers sparsely hairy or glabrous; stigmas ciliate, the lower scarcely the larger; capsule 9–10 mm. long, dehiscing throughout dorsally and splitting septum to base.

Sandy and gravelly soil, Lower Sonoran Zone; mountains and hills in the Mojave and Colorado Deserts, Inyo County to San Diego County, southern California, eastward to southern Nevada. Type locality: near the Colorado River or on Mojave Creek, southern California. Feb.–June.

Mimulus Bigelovii var. *cuspidatus* Grant, *Ann. Mo. Bot. Gard.* 11: 279. 1925. (*Mimulus Bigelovii* var. *panamintensis* Munz, *Leaflets West. Bot.* 2: 113. 1938.) Leaf-blades (bracts) elliptic, acute to acuminate-cuspidate; corolla 12–20(–25) mm. long, its throat pale yellow with relatively large purple spots, the ventral ridges more strongly constricting the corolla-orifice. Sandy or gravelly soil, Lower Sonoran Zone; from Inyo County, southeastern California, to southern Nevada and northwestern Arizona. Type locality: ten miles below Mica Springs, Nevada. March–July.

88. *Mimulus Torreyi* A. Gray. Torrey's Monkey-flower. Fig. 4608.

Mimulus Torreyi A. Gray, *Proc. Amer. Acad.* 11: 97. 1876.

Eunanus Torreyi Greene, *Bull. Calif. Acad.* 1: 104. 1885.

Annual herb, glandular-pubescent with dark glands, the stems erect, 0.5–4 dm. tall. Leaf-blades obovate to narrowly elliptic, obtuse, obscurely dentate to entire, pinnately veined (with lowest veins elongated), long-cuneate to sessile bases; pedicels 1–3 mm. long; calyx 7 mm. long, wing-ridged, the pale glabrescent intervening surface wider than the narrow green ridges, its lobes acute, 1 mm. long, the uppermost 2 mm. long and often acuminate; corolla 15–20 mm. long, purple, externally pubescent, internally slightly pilose around orifice, dorsally dark purple, ventrally pale with 2 pubescent ridges yellow, margined by dark purple, its lobes rounded and the lower retuse; anthers glabrous; stigmas rounded, the lower much the larger; capsule 7–8 mm. long, dehiscing throughout dorsally and splitting septum to base.

Sandy, gravelly, loam, or clay soil, openings in coniferous forest, Transition and Canadian Zones, western slope of Sierra Nevada from Plumas County to Fresno County, California. Type locality: Donner Lake, California. May–Aug.

89. *Mimulus brachiatus* Pennell. Serpentine Monkey-flower. Fig. 4609.

Mimulus brachiatus Pennell, *Notulae Naturae* No. 236. 1. 1951.

Annual herb, pubescent with spreading conspicuously gland-tipped hairs, the stem erect, 0.5–1.5 dm. tall. Leaf-blades oblanceolate, obtuse or acutish, entire, long-cuneate to sessile bases; pedicels 2–3 mm. long; calyx 8–9 mm. long, wing-ridged, narrow intervening surface white in contrast to the green ridges, its lobes acute-acuminate, the uppermost slightly the longest, 2 mm. long; corolla 10–13 mm. long, purple, externally finely pubescent, internally ventrally pale (proximally yellow) and pubescent, purple-spotted and with 2 low ridges, its lobes truncately rounded; anthers glabrous; stigmas unequal, the upper short and truncated, the lower rounded, wider than long; capsule 8 mm. long, dehiscing throughout dorsally and splitting septum to base.

Gravelly serpentine soil, Upper Sonoran Zone; Lake County, central California. Type locality: Lake County, California. May–July.

90. *Mimulus subsecundus* A. Gray. One-sided Monkey-flower. Fig. 4610.

Mimulus subsecundus A. Gray, *Syn. Fl. N. Amer.* ed. 2. 2¹: 445. 1886.

Eunanus subsecundus Greene, *Pittonia* 1: 37. 1887.

Annual herb, pubescent with spreading gland-tipped and glandless hairs, the stem erect, 0.5–2 dm. tall, usually branched from base. Leaf-blades oblanceolate to narrowly elliptic, acute, entire, the lower long-cuneate to sessile bases; pedicels 2 mm. long; calyx 8–9 mm. long, wing-ridged, wide intervening surface pale in contrast to the green ridges, its lobes acute-acuminate, 2 mm. long, but the uppermost 3 mm. long; corolla 15–17 mm. long, red-purple, externally slightly pubescent, internally glabrous, ventrally pale and with 2 yellow ridges, its lobes rounded; anthers glabrous; stigmas rounded, the lower slightly the longer; capsule 7 mm. long, dehiscing throughout dorsally and splitting septum to base.

Dry or parched soil, Transition Zones; Santa Lucia Mountains of Monterey and San Luis Obispo Counties, middle coastal California. Type locality: Pine Mountain, above San Simeon Bay, California. May–July.

91. *Mimulus Rattánii* A. Gray. Rattan's Monkey-flower. Fig. 4611.

Mimulus Rattánii A. Gray, Proc. Amer. Acad. 20: 307. 1885.

Eunanus Rattánii Greene, Bull. Calif. Acad. 1: 105. 1885.

Annual herb, pubescent with reflexed glandless hairs beyond which project spreading gland-tipped ones, the stem erect, 0.5–1.5 dm. tall. Leaf-blades lenticular-oblong, obtuse, distally slightly dentate, longitudinally veined, cuneate to sessile bases; pedicels 1–2 mm. long; calyx 6–8 mm. long, its lobes acute to obtuse; corolla 8–10 mm. long, purple, externally finely pubescent, internally glabrous, dorsally and laterally deep purple, ventrally so in lines median to each lateral lobe and over entire base of the lowermost lobe, and with 2 narrow greenish yellow ridges with intervening space deep purple, the corolla-lobes rounded; anthers glabrous; stigmas unequal, the lower large; capsule 11 mm. long, exserted, dehiscing deeply dorsally and splitting septum to base.

On burns, chaparral, Upper Sonoran Zone; Lake and Colusa Counties, central California. Type locality: Colusa County, California. May–July.

Mimulus Rattánii decurtatus (Grant) Pennell, Notulae Naturae No. 236. 1. 1951. (*Mimulus decurtatus* Grant, Ann. Mo. Bot. Gard. 11: 288. 1925.) Calyx-lobes blunter, truncately rounded to obtuse. Gravelly mountain summits, Transition Zone; Ben Lomond, Santa Cruz Range, Santa Cruz County, middle coastal California. Type locality: Ben Lomond, California. June–July.

92. *Mimulus Bolánderi* A. Gray. Bolander's Monkey-flower. Fig. 4612.

Mimulus Bolánderi A. Gray, Proc. Amer. Acad. 7: 381. 1868.

Eunanus Bolánderi Greene, Bull. Calif. Acad. 1: 105. 1885.

Mimulus Bolánderi var. *brachydontus* Grant, Ann. Mo. Bot. Gard. 11: 275. 1925.

Annual herb, pubescent with reflexed fine glandless hairs beyond which project the spreading gland-tipped ones (the glands relatively large and dark), the stem erect, 2–8 dm. tall. Leaf-blades oblanceolate or narrowly elliptic, acute, distally saliently serrate to denticulate or even entire throughout, longitudinally and pinnately veined, cuneate to sessile bases; pedicels 2–3 mm. long; calyx 15–17 mm. long, plicate-ridged, narrow intervening surface white and glabrescent in contrast to the green and glandular-pubescent ridge-folds, its lobes acute to acuminate, the uppermost longest and most attenuate, projecting 2–4 mm. beyond lowest pair; corolla 16–22 mm. long, purple, externally finely pubescent, internally glandular-puberulent on all sides, ventrally most so, white, and with purple spots, its lobes truncately rounded; anthers glabrous; stigmas rounded, the upper about two-thirds the length of lower; capsule 12–15 mm. long, dehiscing throughout dorsally and splitting septum to base.

Gravelly or stony soil, granitic or calcareous, Upper Sonoran and Transition Zones; lower slopes of the Sierra Nevada from Calaveras County to Fresno County, and in the Coast Ranges from Mendocino and Glenn Counties to Monterey County, California. Type locality: Clark's Ranch, Mariposa County, California. May–July.

93. *Mimulus platylaëmus* Pennell. Wide-throated Purple Monkey-flower. Fig. 4613.

Mimulus platylaëmus Pennell, Proc. Acad. Phila. 99: 169. 1947.

Annual herb, pubescent with recurved fine glandless hairs beyond which project gland-tipped ones, the stem erect, 6–12 dm. tall. Leaf-blades narrowly elliptic or lance-elliptic, acute, denticulate-serrate to nearly entire, cuneate to sessile bases; pedicels 2–3 mm. long; calyx becoming 20–25 mm. long, plicate-ridged, narrow intervening surface white and glabrescent in contrast to the green and glandular-hirsute ridge-folds, its lobes acuminate to attenuate, the uppermost much the longest, lance-attenuate and upcurving, projecting 5 mm. beyond the lowest pair; corolla 25–30 mm. long, purple, externally pubescent proximally, internally glandular-puberulent on all sides, the throat nearly campanulate, ventrally white and with 2 low ridges, the corolla-lobes rounded; anthers glabrous; stigmas ciliolate, the lower twice or thrice length of upper; capsule 18 mm. long, dehiscing distally both dorsally and ventrally, and splitting the septum.

Moist gravelly or sandy granitic soil, Transition Zones; Sierra Nevada of Fresno County, California. Type locality: 4 miles east of Dunlap, California. June–Aug.

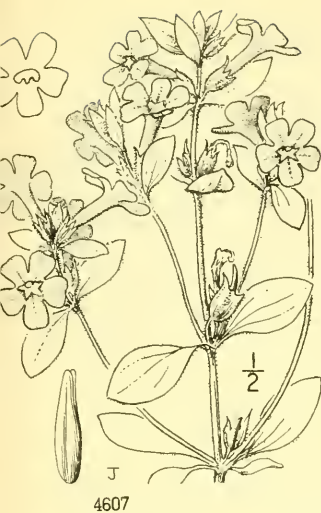
94. *Mimulus brevipes* Benth. Wide-throated Yellow Monkey-flower. Fig. 4614.

Mimulus brevipes Benth. Scroph. Indicae 28. 1835.

Eunanus brevipes Greene, Bull. Calif. Acad. 1: 105. 1885.

Annual glandular-puberulent to -pubescent herb, the stems erect, 4–10 dm. tall. Leaf-blades elliptic- to linear-lanceolate, acute to attenuate, denticulate to entire, pinnately veined, attenuate to sessile (or the lower slightly petioled) bases; pedicels becoming 5–10 mm. long; calyx 20–25 mm. long, plicate-ridged, narrow intervening surface pale in contrast to the green glandular-pubescent ridge-folds, its lobes lanceolate, acuminate to attenuate, the uppermost 9–12 mm. long, distally attenuate and upcurved, the lowest pair only 3–5 mm. long; corolla 25–40 mm. long, yellow, externally glabrous, internally maroon-spotted, ventrally most so and pubescent on the 2 ridges and over base of lowermost lobe, the lobes rounded; anthers glabrous; stigmas ciliolate; capsule 9–13 mm. long, dehiscing distally both dorsally and ventrally, and splitting septum.

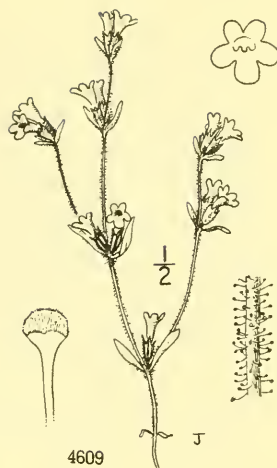
Sandy, gravelly, or loam soil, Upper Sonoran Zone; coastal hills and mountains from Santa Barbara County, southern California, to northern Lower California. Type locality: presumably near Santa Barbara, California. April–June.



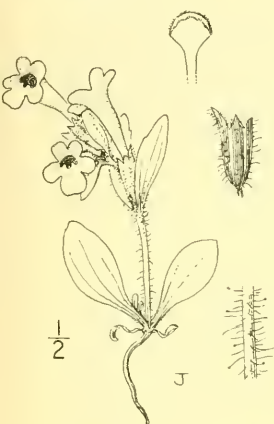
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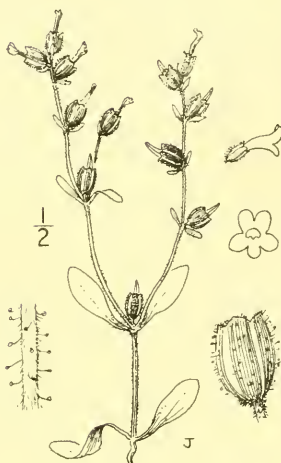
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4610



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4614



4613



4615

4607. *Mimulus Bigelovii*
 4608. *Mimulus Torreyi*
 4609. *Mimulus brachiatus*

4610. *Mimulus subsecundus*
 4611. *Mimulus Rattanii*
 4612. *Mimulus Bolanderi*

4613. *Mimulus platylaemus*
 4614. *Mimulus brevipes*
 4615. *Mimulus mohavensis*

95. *Mimulus mohavensis* Lemmon. Mojave Monkey-flower. Fig. 4615.*Mimulus mohavensis* Lemmon, Bot. Gaz. 9: 142. 1884.*Eumnanus mohavensis* Greene, Bull. Calif. Acad. 1: 106. 1885.

Annual herb, finely pubescent with short hairs, of which a few are glandiferous, the stem erect, 4–7 cm. tall. Leaf-blades elliptic-lanceolate, acute or acutish, entire, longitudinally veined from near base, with longer softer hairs above, attenuately narrowed to sessile bases; pedicels 2–3 mm. long; calyx 10–12 mm. long, plicate-ridged, intervening glabrescent surface nearly as wide as the puberulent ridges, its lobes acuminate-attenuate, ciliate, the uppermost 3–4 mm. long, the lowest pair only 2–2.5 mm. long; corolla 13–15 mm. long, externally glandular-pubescent, its tube-throat cylindric, dark brown-purple, internally hirsute ventrally, its lobes rotately spreading from the rounded orifice, internally glabrous, purple with broad white margin, and with purple-brown reticulum; anthers glabrous; stigmas rounded, the lower slightly the larger; capsule 9–13 mm. long, dehiscent dorsally and splitting septum to base.

Rocky desert, Lower Sonoran Zone; low mountains in Mojave Desert, along Mojave River, San Bernardino County, southern California. Type locality: Mojave Desert. April–June.

96. *Mimulus pygmaeus* Grant. Pigmy Monkey-flower. Fig. 4616.*Mimulus pygmaeus* Grant, Ann. Mo. Bot. Gard. 11: 312. 1925.*Mimulus minutissimus* Eastw. Leaflets West. Bot. 1: 207. 1936.

Annual glandular-hairy herb, the stem simple to somewhat branched, 0.5–1 cm. tall. Leaf-blades linear-lanceolate to oblanceolate, 4–8 mm. long, obtuse, entire, narrowed to short petioles; pedicels 0.5–1 mm. long; calyx becoming 5 mm. long, its tube not ridged nor plicate (but in anthesis dark-lined), pale and finely pubescent with glandless hairs, its lobes linear-lanceolate, acutish, glandular-pilose, the uppermost longest, one and a half times to twice the length of the lowest pair of lobes; corolla 5–7 mm. long, yellowish (or purplish), its throat campanulate and slightly shorter than tube, its lobes rounded and the upper slightly exceeding the lower; anthers glabrous, those of the lower pair smaller or lacking; stigmas unequal, the upper truncate, the lower much longer and acute; capsule at least 4 mm. long, presumably dehiscent.

Presumably in moist open soil, Transition Zones; Jackson County, southern Oregon, to Modoc and Plumas Counties, northern California. Type locality: Egg Lake, Modoc County, California. May–June.

97. *Mimulus pictus* (Curran) A. Gray. Painted Monkey-flower. Fig. 4617.*Eumnanus pictus* Curran ex Greene, Bull. Calif. Acad. 1: 106. 1885.*Mimulus pictus* A. Gray, Syn. Fl. N. Amer. ed. 2: 446. 1886.

Annual glandular-pubescent herb, the stem erect, 1–2.5 dm. tall. Leaf-blades elliptic-oblong, obtuse, slightly dentate-angled, obscurely pinnately veined, cuneately narrowed to sessile or somewhat petioled bases; pedicels 2–3 mm. long; calyx 11–12 mm. long, plicate-angled, glandular-hirsute, its lobes acute, the uppermost longest; corolla 8–9 mm. long, deep reddish purple, its tube-throat cylindrical, its lobes rotately spreading, distally white, reticulately red-veined; anthers glabrous; stigmas unequal, the upper very short and fimbriolate, the lower larger, nearly circular, and entire; capsule 10–12 mm. long, dehiscent throughout dorsally and ventrally, and splitting septum to base.

Presumably in moist open soil, Upper Sonoran Zone; southern part of San Joaquin Valley in Tulare and Kern Counties, California. Type locality: Keene, Kern County, California. April–June.

98. *Mimulus cleistogamus* J. T. Howell. Cleistogamous Monkey-flower. Fig. 4618.*Mimulus cleistogamus* J. T. Howell, Leaflets West. Bot. 2: 79. 1938.

Annual glandular-pilose herb, the stem about 1 cm. tall, much-branched so that the whole plant is ball-like. Leaf-blades oblanceolate, obtuse, distally dentate-lobed, attenuate to sessile or slightly petioled bases; pedicels 2 mm. long; calyx becoming 9–10 mm. long, plicate-ridged, intervening pale glabrescent surface as wide as the sharp wing-like hairy ridges, its lobes obtuse; corolla about 2 mm. long, not opening; capsule 5 mm. long, probably indehiscent.

Gravelly clay soil, Upper Sonoran Zone; Mount Hamilton Range, San Benito County, California. Type locality: near head of Tres Pinos Creek Canyon, 14 miles west of Panoche, California. April–May.

99. *Mimulus rupicola* Coville & Grant. Death Valley Monkey-flower. Fig. 4619.*Mimulus rupicola* Coville & Grant, Journ. Wash. Acad. 26: 99. 1936.

Annual finely pubescent herb, the stem erect, 0.5–1.5 dm. tall, tufted. Leaf-blades oblanceolate or elliptic-oblanceolate, acute, entire, pinnately veined, cuneately narrowed to narrowly winged petioles often as long as the blades (leaves overpassing stems, the blades with petioles reaching 7 cm. long); pedicels 3–4 mm. long; calyx becoming 14–16 mm. long, proximally strongly upcurved, distally plicate-ridged, its lobes finely glandular-pilose, lance-attenuate, the uppermost longest and widest, 5 mm. long, the postero-lateral pair 3 mm. long, the lowest pair 4–5 mm. long but distinct from about 3 mm. proximad to other lobes; corolla 25–30 mm. long, purple, its tube about equaling calyx, its throat nearly campanulate, internally glandular-puberulent (especially on the 2 low ventral ridges) and yellow on all sides and ventrally with garnet-brown spots, its lobes light purple, each with a conspicuous dark purple area medianly at base; anthers glabrous; stigmas equal, truncate-rounded; capsule 3.5 mm. long, slightly de-curved, tardily dehiscent, the cells inverted by twist of pedicel.

Limestone crevices in canyons, Lower Sonoran Zone; low mountains, Death Valley National Monument, Inyo County, California. Type locality: foot of Nevares Peak, Funeral Mountains, Death Valley, California. April.

100. *Mimulus tricolor* Hartw. Tricolor Monkey-flower. Fig. 4620.

Mimulus tricolor Hartw. ex Lindl. Journ. Hort. Soc. Lond. 4: 222. (June) 1849.

Eunanus Coulteri Harv. & Gray ex Benth. Pl. Hartw. 329. (August) 1849.

Eunanus tricolor Greene, Bull. Calif. Acad. 1: 99. 1885.

Annual glandular-pubescent herb, the stems ascending, 1–12 cm. tall, branched at base. Leaf-blades oblanceolate, obtuse, obscurely denticulate to entire, pinnately and longitudinally veined, cuneately narrowed to sessile or scarcely petioled bases (basal exceeded by cauline leaves); pedicels 2–3 mm. long; calyx becoming 12–14 mm. long, pale glabrescent intervening surface as wide as the green pubescent ridges, its lobes oblong-ovate, the uppermost longest, 3 mm. long, the postero-lateral pair 2 mm. long, the lowest pair 1 mm. long but commencing about 1.5 mm. proximad to other lobes; corolla 30–40 mm. long, purple, its tube about twice as long as the calyx, its throat decurved and funnelform-campanulate, dorsally dark purple, ventrally white (distally yellow) with 2 sharp puberulent ridges, on and between which are many small dark purple spots, its lobes purple and each with a large dark purple median spot; anthers finely pubescent; stigmas nearly equal, truncate; capsule 7–8 mm. long, straight, apparently indehiscent.

Wet clay soil, especially desiccated pools, Lower Sonoran Zone to Transition Zones; Willamette Valley, western Oregon, south to San Joaquin Valley, central California. Type locality: presumably Yuba County, California. April–June.

101. *Mimulus pulchellus* (Drew) Grant. Pansy Monkey-flower. Fig. 4621.

Eunanus pulchellus Drew ex Greene, Pittonia 2: 104. 1890.

Mimulus pulchellus Grant, Ann. Mo. Bot. Gard. 11: 316. 1925.

Annual herb, hirsute especially on calyx-tubes, the stem erect or ascending, 1.5–2 cm. tall. Leaf-blades narrowly oblanceolate, obtuse, entire, longitudinally veined, attenuate to sessile or scarcely petioled bases; pedicels 1–2 mm. long; calyx 8–10 mm. long, straight, plicate-ridged, pale glabrescent intervening surface much wider than the hirsute ridges, its lobes enlarged, obtuse, the uppermost longest and united most of length to the postero-lateral pair, the lowest pair much shorter and with deep anterior sinus; corolla 15–45 mm. long, externally somewhat pilose; its tube two and one-half to four times the length of the calyx, yellow or yellowish; its throat decurved, narrowly campanulate, dorsally and laterally dark purple, ventrally yellow, finely maroon-dotted, hirsute to basal half of lowest lobe, and with 2 sharp lower ridges; its lobes rounded, the dorsal pair purple and arched, the lateral pair purple or yellow, and the lowermost one yellow; anthers hirsute; stigmas nearly equal, truncate, ciliate; capsule at least 4–5 mm. long.

Moist meadows, Transition Zones; Sierra Nevada of Tuolumne and Mariposa Counties, California. Type locality: Lake Eleanor, California. May–July.

102. *Mimulus angustatus* A. Gray. Narrow-leaved Pansy Monkey-flower. Fig. 4622.

Eunanus Coulteri var. *angustatus* A. Gray, Proc. Amer. Acad. 7: 381. 1868.

Eunanus angustatus Greene, Bull. Calif. Acad. 1: 99. 1885.

Mimulus angustatus A. Gray, Syn. Fl. N. Amer. ed. 2, 2¹: 443. 1886.

Annual hirsute-pilose herb, the stems only about 0.5 cm. tall, much-branched. Leaf-blades linear-oblanceolate, obtuse, entire, nearly veinless, attenuate to sessile bases; pedicels 0.5–2 mm. long; calyx 10 mm. long, straight, its narrow tube somewhat plicate-ridged, its lobes enlarged, ovate-lanceolate, obtuse or obtusish, the uppermost but little exceeding the others; corolla 35–45 mm. long, externally glabrous, its tube 3 to 6 times the length of the calyx, yellow or yellowish, its throat decurved, funnelform-campanulate, dorsally and laterally dark purple, ventrally glabrous, pale with dark purple dots and with the 2 ridges narrow and sharp, its lobes all purple, each with a median round dark purple spot; anthers hairy; stigmas nearly equal, rounded; capsule at least 3 mm. long, presumably tardily dehiscent.

Desiccated pools and like depressions, Upper Sonoran Zone; foothills of the Sierra Nevada from Plumas County to Fresno County, California. Type locality: Long Valley, Plumas County, California. April–June.

103. *Mimulus Kelloggii* Curran. Kellogg's Monkey-flower. Fig. 4623.

Eunanus Kelloggii Curran ex Greene, Bull. Calif. Acad. 1: 100. 1885.

Mimulus Kelloggii Curran ex A. Gray, Syn. Fl. N. Amer. ed. 2, 2¹: 443. 1886.

Annual herb, pubescent with spreading or recurved hairs some of which are gland-tipped, the stem erect, 0.2–3 dm. tall. Leaf-blades oblanceolate to elliptic-lanceolate, obtuse, obscurely denticulate to entire, cuneately narrowed to sessile or slightly petioled bases; pedicels 3–5 mm. long; calyx 12–14 mm. long, somewhat decurved, the tube plicately ridged, pale glabrescent intervening surface as wide as the green glandular-pubescent ridges, its lobes blunt or rounded, the uppermost longest, 3 mm. long, and joined far to the postero-lateral pair, the lowest pair free 1 mm.; corolla 30–45 mm. long, purple, glabrous throughout, its tube twice to two and a half times the length of the calyx, proximally white, distally dorsally dull purple and ventrally yellow, its throat short, funnelform-campanulate, dorsally arched and dark purple, laterally and distally only slightly paler, ventrally with 2 yellow ridges, its lobes circular-rounded, the two upper 7 mm. long, about twice the length of the three lower lobes; anthers pilose-ciliate; stigmas fimbriate-ciliate, the upper short and triangular-acute, exceeded by the lower plate-



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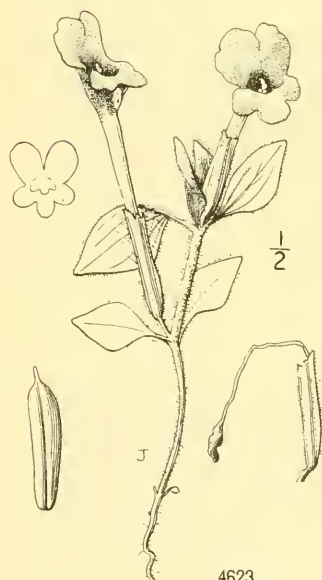
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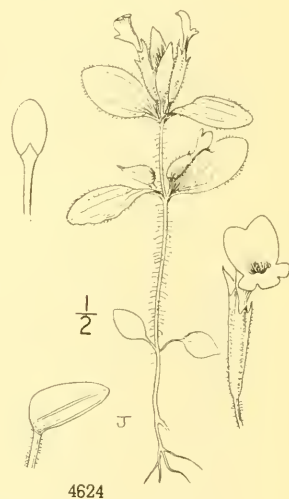
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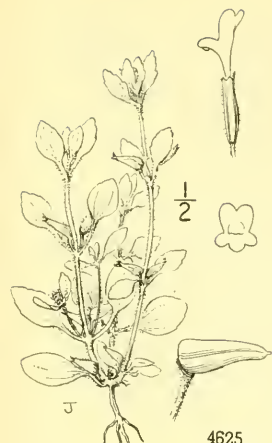


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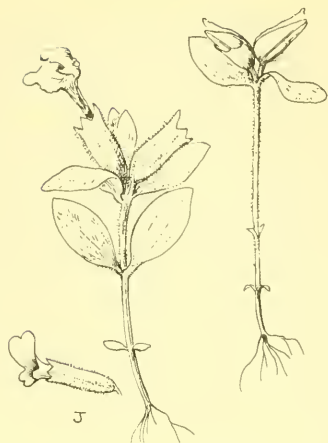
4616. *Mimulus pygmaeus*
 4617. *Mimulus pictus*
 4618. *Mimulus cleistogamus*

4619. *Mimulus rupicola*
 4620. *Mimulus tricolor*
 4621. *Mimulus pulchellus*

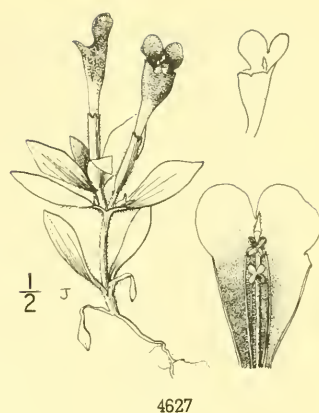
4622. *Mimulus angustatus*
 4623. *Mimulus Kelloggii*
 4624. *Mimulus Traskiae*



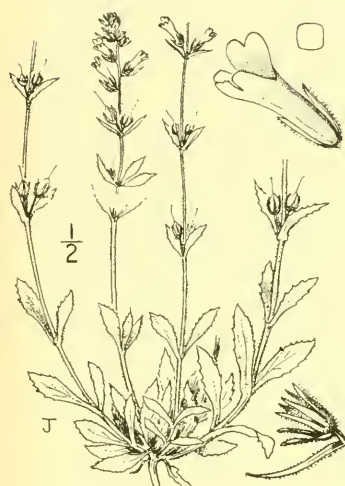
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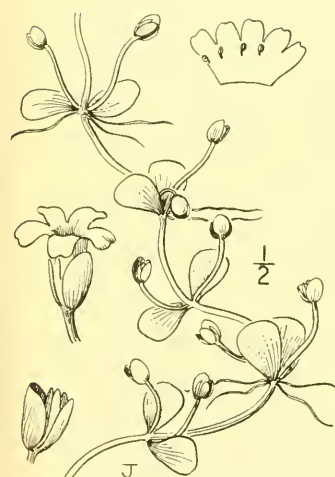
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4625. *Mimulus Congdonii*
 4626. *Mimulus Brandegei*
 4627. *Mimulus Douglasii*

4628. *Stemodia arizonica*
 4629. *Gratiola neglecta*
 4630. *Gratiola ebracteata*

4631. *Bacopa Eisenii*
 4632. *Limosella aquatica*
 4633. *Limosella acaulis*

like papillate one; capsule 8 mm. long, slightly decurved, its upper cell larger, presumably tardily dehiscent or indehiscent.

Clay soil, openings in coniferous forest, Lower and Upper Sonoran Zones; Interior Valley from Shasta County to Kern County, California. Type locality: presumably Sacramento County, California. March-June.

104. *Mimulus Traskiae* Grant. Santa Catalina Monkey-flower. Fig. 4624.

Mimulus Traskiae Grant, Field Mus. Bot. Ser. 5: 226. 1923.

Annual herb, pubescent with spreading or recurved gland-tipped hairs, the stem erect, 1 dm. tall. Leaf-blades oval or ovate-oval, obtuse, obscurely crenate-dentate to entire, sessile (the lowest smaller and slender-petioled); pedicels 3-4 mm. long; calyx 17-20 mm. long, its tube plicately ridged, intervening surface between the green glandular-pubescent ridges pale and glabrescent, its lobes lanceolate, very unequal, the uppermost 3-3.5 mm. long, united largely with the shorter postero-lateral pair, the lowest pair more deeply separated from others and 1.5-2 mm. long; corolla 20-35 mm. long, glabrous (not seen fresh), its tube about equaling the calyx, its throat short, funnelform-campanulate, purple, its lobes rounded, its two upper lobes white and 5-6 mm. long, its three lower lobes purple and less than 1 mm. long; anthers glabrous; stigmas very unequal, the upper short-triangular, one-fourth to one-third the length of the narrow oval lower one; capsule 7.5 mm. long, slightly decurved, tardily or not dehiscent.

In shade, Upper Sonoran Zone; Santa Catalina Island, southern California. Type locality: near Avalon, Santa Catalina Island, California. March.

105. *Mimulus Congdonii* Robinson. Congdon's Monkey-flower. Fig. 4625.

Mimulus Congdonii Robinson, Proc. Amer. Acad. 26: 175. 1891.

Eunanus Congdonii Greene, Erythea 1: 247. 1893.

Eunanus Douglasii parviflorus Greene, Man. Bay Reg. 276. 1894.

Mimulus modestus Eastw. Zoe 5: 84. 1900.

Mimulus Kelloggii var. *parviflorus* Jepson, Fl. W. Mid. Calif. 404. 1901.

Annual herb, hirsute-pubescent with mostly glandless hairs, at first nearly acaulescent, branched at base, the erect stems becoming 6-8 cm. tall. Leaf-blades elliptic, obtuse, bluntly dentate to nearly entire, cuneately narrowed to slightly or well-petioled bases; pedicels becoming 4 mm. long; calyx 9-10 mm. long, straight, its tube plicately ridged, pale glabrescent, intervening surface as wide as the green hirsute-pubescent ridges, its lobes linear and obtuse, the uppermost longest, 1-2 mm. long, the lowest pair less than 1 mm. long; corolla 13-25 mm. long, purple, externally sparsely hairy, its tube one and a half times to twice the length of the calyx, its throat short, funnelform-campanulate, its lobes rounded, the upper two 3-5 mm. long, the lower three 1.5-3 mm. long; anthers glabrous; stigmas unequal, the upper short and acute, the lower longer, ovate and rounded; capsule 5-7 mm. long, slightly decurved, tardily or perhaps not dehiscent.

Moist soil, Upper Sonoran and Transition Zones; Coast Ranges from Mendocino County to Monterey County, and in the southern Sierra Nevada from Mariposa County to Tulare County, California. Type locality: Zimmerman's Ranch, Mariposa County, California. March-May.

106. *Mimulus Brandegei* Pennell. Santa Cruz Dwarf Monkey-flower. Fig. 4626.

Mimulus Brandegei Pennell, Proc. Acad. Phila. 99: 170. 1947.

Annual glandular-pubescent herb, the erect stem 2-3 cm. tall. Leaf-blades narrowly elliptic to spatulate-oval, obtuse, entire, cuneately narrowed to shortly petioled bases; pedicels 1-2 mm. long, strongly ridged distally; calyx 10-12 mm. long, straight or nearly so, its tube scarcely ridged, its lobes obtuse, the uppermost about one and a half times the length of the others; corolla 13-15 mm. long, purple, its tube equaling the calyx, its throat funnelform or more abruptly widened, its lobes rounded, the upper two 3-4 mm. long, the lower about 1 mm. long; anthers glabrous; capsule 7 mm. long, slightly decurved, its cells unequal, tardily or not dehiscent.

Presumably moist soil, Upper Sonoran Zone; Santa Cruz Island, southern California. Type locality: Santa Cruz Island, California. Spring.

107. *Mimulus Douglasii* (Benth.) A. Gray. Purple Mouse-ears. Fig. 4627.

Mimulus nanus var. *subuniflorus* Hook. & Arn. Bot. Beechey 378. 1838.

Eunanus Douglasii Benth. in A. DC. Prod. 10: 374. 1846.

Mimulus atropurpureus Kell. Proc. Calif. Acad. 1: 59. 1855.

Mimulus Douglasii A. Gray, Bot. Calif. 1: 563. 1876.

Eunanus subuniflorus Greene, Man. Bay Reg. 275. 1894.

Mimulus subuniflorus Jepson, Fl. W. Mid. Calif. 404. 1901.

Annual herb, the stem less than 3 cm. tall, erect or decumbent, pubescent with recurved fine glandless hairs and distally pilose with longer spreading hairs of which some are gland-tipped. Leaf-blades narrowly elliptic, obtuse, crenulate to crenate-dentate, longitudinally veined, cuneately narrowed to short-petioled bases; pedicels becoming 2 mm. long; calyx 10-12 mm. long, straight, plicate-ridged, pale glabrous intervening surface as wide as the sharp pilose to glabrous ridges, its lobes lanceolate, obtuse, ciliate, the uppermost about twice the length of the lowest pair and attached far to the lateral pair; corolla 30-40 mm. long, purple, externally nearly glabrous, its tube about twice as long as the calyx, its throat funnelform-campanulate, dark purple, ventrally somewhat streaked and with the 2 ridges pale, its upper lip 9-10 mm. long, erect-arched, with rounded lobes, its lower lip rudimentary or lacking; anthers glabrous;

stigmas very unequal, the upper short and triangular-acute, the lower linear-oblong, ciliate; capsule 6 mm. long, slightly decurved, tardily or probably not dehiscent.

Moist soil, meadows and rocky places, Upper Sonoran and Transition Zones; Douglas County, southern Oregon, south to San Benito and Tulare Counties, central California. Type locality: California. March-May.

4. *STEMODIA* L. Syst. Nat. ed. 10. 1118. 1759.

Erect perennial herb, with opposite serrate clasping leaves and flowers axillary to the narrow bracts of a loose raceme. Bracteoles 2, just beneath calyx. Sepals 5, distinct, linear-lanceolate. Corolla blue-violet, the tube (throat) cylindrical, strongly 2-lipped, its upper lip arched with lobes free less than one-third its length, its lower lip deflexed-spreading, the 3 lobes proximally distinct and hirsute-pubescent. Filaments 4, didynamous (2 upper shorter), all antheriferous, the anther-cells separated on short arms of the thickened connective. Stigmas distinct, lamelliform. Capsule cylindric-ovoid, primarily septicidal, but also loculicidal. Seeds many, obscurely reticulate. [Name abbreviated from *Stemodiocræ*, meaning stamens with two tips.]

About 20 species, mostly of Tropical America. Type species, *Stemodia maritima* L.

1. *Stemodia arizonica* Pennell. Arizona Stemodia. Fig. 4628.

Stemodia arizonica Pennell, Notulae Naturae No. 43: 3. 1940.

A weedy plant, 1-5 dm. tall, glandular-pubescent, with elliptic-oblancheolate lower leaves, diminishing to the narrow bract-leaves. Racemes of 6 to 12 remote fascicles; lower pedicels 2-12 mm. long; sepals 5-6 mm. long, lanceolate-attenuate; corolla 7-8 mm. long; capsule 5 mm. long.

Sandy soil, Lower Sonoran Zone; southern California and southern Arizona to southern Sonora. Type locality: Santa Catalina Mountains, Arizona. Throughout year.

5. *GRATIOLA* L. Sp. Pl. 17. 1753.

Erect or diffuse herbs, ours annual, with opposite entire to denticulate sessile leaves and flowers that are axillary to the foliose bracts of a simple loose raceme. Bracteoles just beneath calyx or else lacking. Sepals 5, distinct. Corolla (in ours) white, or with purplish limb, its tube quadrangular and (in ours) yellow, the upper lobes united and hirsute at base. Antheriferous stamens 2 (the upper pair), the lower filaments rudimentary or lacking; anther-cells parallel on the flat expanded connective. Stigmas 2, lamelliform. Capsule loculicidal, and secondarily often also septicidal; seeds many, wingless. [Name Latin, meaning grace or favor, from its reputed healing properties.]

About 20 species, of wide distribution. Type species, *Gratiola officinalis* L.

Pedicels bibracteolate beneath calyx; leaves and sepals obtuse or acutish, the latter 5-6 mm. long; capsule ovoid; plants finely glandular-pubescent.

1. *G. neglecta*.

Pedicels ebracteolate; leaves and sepals attenuate, the latter 8-23 mm. long; capsule nearly globose; plants glabrous.

2. *G. ebracteata*.

1. *Gratiola neglecta* Torr. Common American Hedge-hyssop. Fig. 4629.

Gratiola neglecta Torr. Cat. Pl. N.Y. 89. 1819.

Stem 1-3 dm. tall, finely glandular-pubescent. Leaves oblong-lanceolate to nearly obovate, distally denticulate, rounded-clasping at base; pedicels 10-20 mm. long, slender, spreading; bracteoles 2, as long as or longer than the lanceolate sepals; corolla 9-10 mm. long, its upper lobes joined nearly to apex; capsule 5 mm. long.

Stream beds and ditches, Transition Zones; southern British Columbia south to the Sierra Nevada of California, eastward to the Atlantic Ocean. Type locality: within 30 miles of New York City. May-Aug.

2. *Gratiola ebracteata* Benth. Bractless Hedge-hyssop. Fig. 4630.

Gratiola ebracteata Benth. in DC. Prod. 10: 595. 1846.

Stem 0.3-1.5 dm. tall, glabrous. Leaves lanceolate-attenuate, distally slightly denticulate, slightly clasping at base; pedicels 10-23 mm. long, stout, ascending; bracteoles none; sepals lance-attenuate; corolla 5-7 mm. long, its upper lobes united less than half the length; capsule 4-5 mm. long.

Ditches and muddy shores, Upper Sonoran and Transition Zones; Vancouver Island to central California, northward east to northern Idaho. Type locality: Oregon. April-Aug.

6. *BACOPA* Aubl. Hist. Pl. Guiane Franc. 1: 128. 1775.

Lax herbs (ours aquatic), with opposite leaves (in ours entire and palmately many-veined) and axillary flowers. Bracteoles lacking (in ours). Sepals 5, distinct, dissimilar. Corolla white (in ours), campanulate (in ours). Antheriferous stamens 4. Capsule globose or globose-ovoid (in ours), about equally septicidal and loculicidal. Seeds many, wingless, reticulate. [An aboriginal name.]

About 60 species, mostly of the New World tropics. Type species: *Bacopa aquatica* Aubl.

1. *Bacopa Eisèni* (Kell.) Pennell. Western Hydranthele. Fig. 4631.*Ranapalus Eisèni* Kell. Proc. Calif. Acad. 7: 113. 1876.*Macuillamia Eisèni* Pennell, Monog. Acad. Phila. 1: 57. 1935.*Bacopa Eisèni* Pennell, Proc. Acad. Phila. 98: 96. 1946.

Stem fleshy, much-branched, 2-3 dm. long or more, distally pubescent. Leaves cuneate-obovate, rounded, 7-11-veined, becoming 1.5-2 cm. long; pedicels 10-50 mm. long, pubescent to glabrate distally; sepals 6-7 mm. long, the outermost oval, green, and many-veined, about 3 times the width of the oblong-lanceolate hyaline innermost ones; corolla 9-10 mm. long; styles distinct near apex, the stigmas isolated; capsule 4-5 mm. long.

Pools, Lower Sonoran Zone; San Joaquin Valley of central California, and also in Nevada. Type locality: Fresno, California. Summer.

7. *LIMOSÉLLA* [Lindern] L. Sp. Pl. 631. 1753.

Acaulescent perennial glabrous herbs, the leaf-blades long-petioled, entire, and palmately veined, and the flowers solitary on long pedicels. Bracteoles none. Sepals united half their length, distally ovate and acute. Corolla nearly rotate, the lobes 5, white or pinkish-tinged, acute. Stamens 4, nearly equal; anther-cells wholly confluent. Stigmas united and capitate. Capsule septicidal, distally 1-celled, the septum not extending through-out. [Name Latin, meaning mud and seat.]

About 15 species, widely distributed. Type species: *Limosella aquatica* L.

Style 0.2-0.4 mm. long, usually sharply decurved at base; corolla-lobes acute, dull white or pinkish; capsule obovoid to ellipsoid; leaf-blades elliptic or oval, 2-8 mm. wide.

Style 0.5-1 mm. long, straight or arcuately curved; corolla-lobes rounded, white or violet-tinged; capsule globose-ellipsoid; leaf-blades narrower, 0.5-2 mm. wide.

1. *L. aquatica*.2. *L. acaulis*.1. *Limosella aquática* L. Northern Mudwort. Fig. 4632.*Limosella aquatica* L. Sp. Pl. 631. 1753.

Plants densely floriferous, each usually surrounded by a group of secondary plantlets on stolons. Leaf-blades oblong to elliptic, 1-1.5 cm. long, abruptly or cuneately narrowed to petioles usually 2 to 4 times the length of the blades; pedicels less than or about half the length of the petioles; capsule 3 mm. long.

Muddy shores of streams or ponds, Upper Sonoran and Transition Zones; southern British Columbia to south central California, eastward to Minnesota and New Mexico, and at remote northern localities from Alaska to Newfoundland, and in northern Eurasia. Type locality: northern Europe. May-Nov.

2. *Limosella acaulis* Sessé & Moc. Southern Mudwort. Fig. 4633.*Limosella acaulis* Sessé & Moc. Fl. Mex. 156. 1895.

Plants more cespitose, so massed as to obscure the stolons. Leaf-blades linear-oblancoelate, 0.6-1.2 cm. long, attenuate to petioles usually several times the length of the blades; pedicels mostly about the length of the petioles; capsule 3 mm. long.

Shores of lakes or ponds, Transition Zones; coastal California to southern New Mexico, southward to Lower California and the Mexican plateau. Type locality: San Felipe del Obraje, Mexico. May-Nov.

8. *VERBÁSCUM* [Bauhin] L. Sp. Pl. 177. 1753.

Erect simple or virgately branched herbs, from perennial or biennial roots, the cauline leaves alternate, sessile, clasping or somewhat decurrent, and the flowers in racemes or crowded spikes. Bracteoles none. Sepals 5, distinct, uniform. Corolla rotate, slightly zygomorphic, yellow (or occasionally white), the lower lobes slightly the longer. Stamens 5, the filaments villose-pubescent, alike or the lower pair different from the others. Stigmas united and capitate. Capsule ellipsoid to subglobose, septicidal. Seeds numerous, wingless. [The Latin name of the great mullein.]

About 250 species, natives of Eurasia. Type species: *Verbascum Thapsus* L.

Plants with simple gland-bearing hairs; leaf-blades sinuately dentate or denticulate, slightly or not pubescent; filaments all densely villose with purple knobbed hairs; capsule subglobose.

Pedicels 10-15 mm. long; capsule glandular-puberulent; leaf-blades sinuately dentate, glabrous; plant bearing only simple glandular hairs.

1. *V. Blattaria*.

Pedicels 3-5 mm. long; capsule pubescent with stellate glandless as well as simple glandular hairs; leaf-blades sinuately denticulate, pubescent; plant bearing very short glandular hairs, that are often exceeded by simple or stellate glandless hairs.

2. *V. virgatum*.

Plants only with stellately branched glandless hairs; leaf-blades entire, tomentose; pedicels less than 10 mm. long; three upper filaments strongly villose, the two lower less so and with filiform yellow hairs; capsule ovoid or cylindric.

Capsule 4-6 mm. long; lower filaments villose, their anthers not decurrent; fascicles 5-9-flowered, the primary pedicels longer than the capsules; inflorescence much-branched, the fascicles disjunct; leaves not decurrent, the blades closely tomentose.

3. *V. speciosum*.

Capsule 8-10 mm. long; lower filaments nearly glabrous, their anthers decurrent at base; fascicles few-flowered, the pedicels very short or suppressed; inflorescence simple, the fascicles confluent and densely crowded; leaves conspicuously decurrent, the blades with larger and looser hairs.

4. *V. Thapsus*.

1. *Verbascum Blattaria* L. Moth Mullein. Fig. 4634.*Verbascum Blattaria* L. Sp. Pl. 178. 1753.

Stem 4–12 dm. tall, simple or slightly branched, distally glandular-pubescent. Cauline leaf-blades 2–12 cm. long, elliptic to ovate, doubly serrate-crenate, not decurrent; pedicels solitary, 10–15 mm. long, much exceeding the lance-subulate bracts; sepals 5–8 mm. long, linear-lanceolate; corolla 25–30 mm. wide, yellow or white; capsule 6–8 mm. long.

Fields and roadsides, naturalized from Eurasia. May–Oct.

2. *Verbascum virgatum* Stokes. Wand Mullein. Fig. 4635.*Verbascum virgatum* Stokes ex With. Bot. Arr. Brit. Pl. ed. 2. 1: 227. 1787–93.

Stem 6–12 dm. tall, simple or slightly virgately branched, stellate-pubescent. Cauline leaf-blades 7–15 cm. long, lanceolate, crenate, not decurrent; pedicels 1–4, 2–5 mm. long, shorter than or equaling the ovate bracts; sepals 5–6 mm. long, lanceolate; corolla about 25 mm. wide, yellow; capsule 7–8 mm. long.

Roadsides, southern California, naturalized from Eurasia. May–Oct.

3. *Verbascum speciosum* Schrad. Showy Mullein. Fig. 4636.*Verbascum speciosum* Schrad. Ind. Sem. Hort. Gotting. 22. pl. 16. 1809.

Plant canescent with stellately branched hairs; stem 10–15 dm. tall, branching in the inflorescence. Cauline leaf-blades 30–40 cm. long, oblanceolate, entire, not decurrent; pedicels 5–10 mm. long, 5 to 9 in a fascicle that exceeds the short ovate bracts; sepals 4–4.5 mm. long, linear; corolla 20 mm. wide, yellow; capsule 5 mm. long, stellate-pubescent.

Sandy waste places, Portland, Oregon, naturalized from Eurasia.

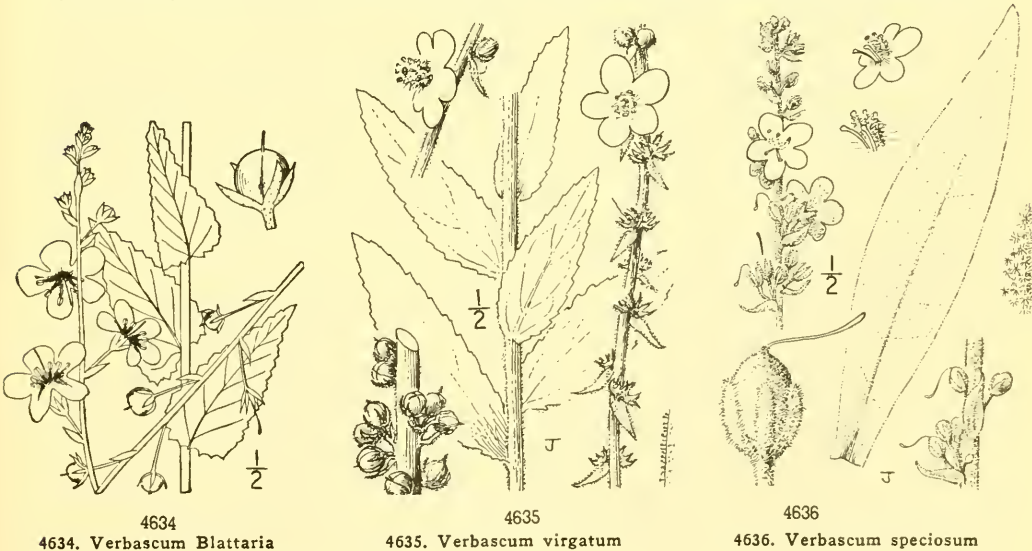
4. *Verbascum Thapsus* L. Woolly Mullein. Fig. 4637.*Verbascum Thapsus* L. Sp. Pl. 177. 1753.

Plant densely tomentose with stellately branched hairs; stem 3–12 dm. tall, simple. Cauline leaf-blades 5–30 cm. long, elliptic-lanceolate, entire or nearly so, long-decurrent; pedicels less than 2 mm. long, usually 1 to an axil, much exceeded by the bracts; sepals 7–9 mm. long, lanceolate or ovate with caudate tip; corolla 15–20 mm. wide, yellow; capsule 8 mm. long.

Roadsides and fields, throughout temperate North America, naturalized from Eurasia. June–Sept.

9. **PÉNSTEMON*** Mitch. Nov. Gen. Pl. Virg. 36. 1769.

Perennial herbs or shrubs. Leaves opposite, rarely ternate or the upper ones alternate, the lower usually petiolate, the upper sessile. Flowers showy, in racemose, thyrsoid, or cymose panicles. Calyx 5-parted. Corolla tubular, the throat often amplified, the limb nearly regular to strongly bilabiate, the upper lip 2-lobed, the lower lip 3-cleft. Fertile stamens 4, paired, with arching filaments, a fifth represented by a long sterile filament (staminode) often dorsally bearded; anthers 2-celled, the cells frequently confluent. Cap-

4634. *Verbascum Blattaria*4635. *Verbascum virgatum*4636. *Verbascum speciosum*

* Text contributed by David Daniels Keck.

sule septicial, cartilaginous. Seeds numerous, with irregularly angled cellular coat. [Greek, meaning five and stamen, the fifth and sterile filament being strongly developed.]

A genus of some 230 species, most plentiful in the western United States, but extending from Alaska to Guatemala, with one species in Kamchatka and northern Japan. Type species, *Penstemon laevigatus* Sol. Chromosome numbers, determined or verified by the contributor, are given when known.

Filaments glabrous at base or, at most, two of them puberulent.

Anthers glabrous or sparingly hairy, not comose; corolla rounded dorsally.

Orifice of corolla more or less open, revealing the stamens, bearded only ventrally within or glabrous; staminode at least half the length of the corolla.

Anther-sacs opening from the free tips throughout or partially, after dehiscence almost always becoming divaricate. Subgenus I. EUPENSTEMON.

Seeds 0.5–1.5 mm. long (sometimes longer in subsections *Gairdnerani*, *Deusti*, and *Arenarii*); corolla somewhat compressed dorso-ventrally, 2-ridged on floor of throat, tubular or only moderately ampliate, never red; anther-sacs widely divaricate and glabrous (occasionally denticulate along the suture).

Stems erect or slightly decumbent at base; leaves ample, not densely crowded; inflorescence an interrupted strict dense thyrsus, or sometimes more openly panicate. Section 1. SPERMUNCULUS.

Stems low, generally tufted at base, often repent; leaves filiform to broadly linear, when wider less than 3 cm. long, densely crowded; inflorescence a narrow leafy racemiform thyrsus. Section 2. ERICOPSIS.

Seeds 1.5–5 mm. long; corolla-throat rounded, scarcely if at all 2-ridged ventrally, tubular to strongly dilated.

Staminode densely bearded with prominent golden hairs; herbage in ours densely cinereous-puberulent or canescent, the inflorescence glandular-pubescent; short-lived few-stemmed perennials from a taproot. Section 3. AURATOR.

Staminode glabrous or, if bearded, the beard not prominently golden; herbage in ours essentially glabrous below, the inflorescence glabrous or glandular-pubescent.

Corolla blue or purple to carmine, rose, or white, if scarlet, the anthers peltately explanate.

Leaves not glaucous or thick, always entire, reduced above to lanceolate bracts; corolla obviously bilabiate, the limb not rotately spreading, the throat ample, blue-purple, glabrous; inflorescence secund; anther-sacs in ours not dehiscent throughout nor explanate, hairy or glabrous. Section 4. HABROANTHUS.

Leaves more or less glaucous and fleshy; inflorescence not secund; anther-sacs never hairy.

Inflorescence congested, leafy, the bracts in ours cordate; corolla subregular, the short limb rotately spreading, light blue-purple, glabrous; anther-sacs boat-shaped. Section 5. ANULARIUS.

Inflorescence more open, the bracts various; corolla commonly glandular-pubescent externally, shape and color various; anther-sacs mostly peltately explanate. Section 6. PELTANTHERA.

Corolla scarlet; anther-sacs opening by a slit, never peltately explanate. Section 7. ELMIGERA.

Anther-sacs opening across their contiguous apices, the free tips remaining saccate, parallel even after dehiscence, glabrous or somewhat hairy. Subgenus II. SACCANTHERA.

Corolla bluish or purplish, usually ampliate; limb relatively short, with both lips more or less spreading. Section 8. EUSACCANTHERA.

Corolla scarlet-red, tubular; limb relatively long, the upper lip erect, the lower lip sharply reflexed. Section 9. EMERSUS.

Orifice of corolla closed, concealing the stamens, bearded on all sides within; staminode barely one-fifth the length of the corolla. Subgenus III. CRYPTOSTEMON.

Anthers densely comose, the cells peltately explanate; corolla strongly 2-ridged on floor of throat and prominently keeled dorsally.

Low, often decumbent plants, considerably woody; leaves coriaceous; inflorescence subracemose; corolla externally glandular. Subgenus IV. DASANTHERA.

Tall, erect plants, herbaceous quite to the base; leaves thin; inflorescence openly panicate; corolla externally glandular. Subgenus V. NOTHOCHELONE.

Filaments all strongly pubescent at base; corolla strongly bilabiate, the upper lip subgaleate, lower lip reflexed; shrubs. Subgenus VI. HESPEROTHAMNUS.

Subgenus I. EUPENSTEMON.

Section 1. SPERMUNCULUS.

Plants with aerial more or less suffrutescent or woody caudex.

Suffrutescent or herbaceous at base; staminode bearded.

Leaves all opposite, linear-lanceolate to broadly ovate, flat or folded but never revolute.

Leaves very entire (sometimes toothed in *P. attenuatus* and *P. Vaseyanus*); inflorescence of compact many-flowered verticillasters, glabrous or glandular; corolla not paler within, usually obscurely bilabiate. Subsection a. PROCERI.

Leaves more or less serrate or toothed at least some of the time; inflorescence of rather loose verticillasters, or the cymules few-flowered, always glandular-pubescent; corolla paler within throat, usually obviously bilabiate. Subsection b. HUMILES.

Leaves alternate or opposite, linear, entire, revolute; suffrutescent; inflorescence glandular; corolla not villous nor ridged but glabrous or glandular within; anther-sacs not explanate. Subsection c. GAIRDNERANI.

Shrubby, caudex obviously woody at base; leaves serrate, coriaceous; inflorescence glandular; corolla often glandular within, narrowly tubular, whitish or yellowish; anther-sacs broadly ovate, explanate; staminode glabrous or sparsely bearded. Subsection d. DEUSTI.

Plants with buried caudex, fibrous rootstocks, and no rosette; inflorescence leafy; anther-sacs broadly ovate, explanate; plants of desert sand dunes. Subsection e. ARENARI.

Subsection *a*. *PRO CER I*.

Corolla not yellow, or if yellow the inflorescence glandular (except in a form of *P. Tolmiei*); bracts not scarious-margined nor erose.

Corolla 6–10 mm. long (to 11 mm. in *P. washingtonensis*), more or less declined; anther-sacs rotund, essentially explanate, mostly 0.5 mm. or less long.

Inflorescence not at all glandular.

Leaf-blades lanceolate or wider, not recurved.

Basal rosette feebly developed; calyx-lobes caudate-tipped, 3–6 mm. long.

1. *P. procerus*.

Basal rosette well developed; calyx-lobes caudate-tipped only in ssp. *typicus*, usually less than 3 mm. long.

2. *P. Tolmiei*.

Leaf-blades narrowly linear-lanceolate, more or less recurved; calyx 1.4–2 mm. high, the lobes truncate or mucronate.

3. *P. cinicola*.

Inflorescence glandular-pubescent.

Rosette undeveloped; stems 2.5–7 dm. tall; calyx 1.7–3.3 mm. high, the lobes acute to acuminate; corolla pale purplish blue or roseate to white.

4. *P. Peckii*.

Rosette well developed; stems less than 2.5 dm. tall; calyx 4–6 mm. high, the lobes caudate-tipped; corolla deep blue-purple.

5. *P. washingtonensis*.

Corolla 10 mm. or more long, horizontal; anther-sacs longer than broad, mostly more than 0.5 mm. long.

Inflorescence not at all glandular.

Herbage not glaucous.

Anther-sacs dehiscent throughout and boat-shaped but not fully explanate nor pouch-shaped, the suture essentially glabrous; corolla usually less than 15 mm. long and up to 5 mm. wide pressed.

Flowers blue-purple; cymules dense.

Stems relatively slender; leaves always entire; corolla only slightly ampliate, up to 4 mm. wide pressed, obscurely bilabiate, the palate yellowish-bearded.

Mostly less than 5 dm. tall; calyx mostly 5 mm. or less high and glabrous, the lobes acuminate. East of the Cascades.

6. *P. oreocharis*.

Mostly more than 5 dm. tall; calyx mostly more than 5 mm. high and hirtellous, the lobes attenuate. West of the Cascades.

7. *P. hesperius*.

Stems relatively stout; leaves occasionally denticulate; corolla more obviously ampliate and bilabiate, up to 5 mm. wide pressed, the palate white-bearded.

8. *P. Vaseyanus*.

Flowers white; cymules not very dense.

9. *P. pratensis*.

Anther-sacs not quite dehiscent throughout, pouch-shaped, the suture denticulate; corolla mostly 15–20 mm. long and up to 7 mm. wide pressed; margin of calyx-lobes broadly scarious and erose.

10. *P. globosus*.

Herbage glaucous; anther-sacs narrowly ovate, dehiscent throughout but not explanate. Cascade Range.

11. *P. euglaucus*.

Inflorescence glandular-pubescent.

Corolla relatively small and slender; leaves thin, not glaucous. California.

Stems relatively low (mostly 2 dm. or less tall); inflorescence prominently glandular, often reduced to one cluster. High elevations, Sierra Nevada.

12. *P. heterodoxus*.

Stems taller (2–5 dm.); inflorescence less glandular, of 2–6 clusters. Mid-altitudes, northern California.

13. *P. shastensis*.

Corolla larger and more ampliate; leaves thicker. More northern.

Herbage glaucous; corolla not lined within. Southern Oregon.

14. *P. glaucinus*.

Herbage not glaucous.

Stems 3–9 dm. tall; leaves mostly acute, relatively thin; corolla 12–20 mm. long, pale yellow to blue-purple, without prominent guide lines.

15. *P. attenuatus*.

Stems 1–2.5 dm. tall; leaves mostly rounded, relatively thick; corolla 10–13 mm. long, violet-blue, marked with guide lines within.

16. *P. spathulatus*.

Corolla pale yellow; inflorescence glabrous; margin of calyx-lobes and bracts broadly scarious and erose.

17. *P. confertus*.

Subsection *b*. *HUMILES*.

Calyx 2–5 mm. high; corolla blue-purple, moderately bilabiate, the limb spreading, the palate moderately ridged; staminode not prominently exerted; stems, at least, more or less pubescent below inflorescence.

Leaves essentially entire, cinereous-puberulent; stems densely cespitose.

Limb of corolla narrow in ours, less than twice as wide as throat. California.

18. *P. humilis*.

Limb of corolla broad, at least twice as wide as throat. Oregon and Washington.

19. *P. cinereus*.

Leaves serrate (except in *P. subserratus*) and less densely if at all cinereous; stems less densely cespitose.

Cauline leaves narrowly linear-lanceolate, sessile by a relatively narrow base; corolla 15–21 mm. long. Wallowa County, Oregon.

20. *P. elegantulus*.

Cauline leaves broader, sessile by a wide base, the upper cordate-amplexicaul.

Inflorescence strongly glandular. Western British Columbia to western Oregon.

Thyrus narrowly paniculate, rather loose, not foliose; corolla 15–22 mm. long. West of the Cascades.

21. *P. ovatus*.

Thyrus strict, narrow, foliose below; corolla 10–16 mm. long. East of the Cascades.

Stems 1–3 dm. tall; leaves mostly obviously toothed; anther-sacs ovate to rotund, 0.5–0.7 mm. long.

22. *P. pruinosis*.

Stems 3–8 dm. tall; leaves entire or obscurely toothed; anther-sacs narrowly to broadly ovate, 0.8–1.1 mm. long.

23. *P. subserratus*.

Inflorescence lightly to moderately glandular. Eastern Washington and Oregon eastward.

24. *P. Wilcoxii*.

Calyx 5–11 mm. high; corolla lavender to purple or violet, strongly bilabiate, the short upper lip erect, the longer lower lip spreading, the palate strongly ridged; staminode prominently exserted; herbage glabrous below inflorescence.

Corolla 13–18 mm. long, 4–6 mm. wide pressed; calyx 4–7 mm. high; anther-sacs 0.8–1.1 mm. long.
25. *P. anguineus*.

Corolla 24–30 mm. long, 8–10 mm. wide pressed; calyx 6–9 mm. high; anther-sacs 1.2–1.4 mm. long.
26. *P. Rattanii*.

Subsection c. GAIRDNERANI.

Corolla glabrous within, the limb small.

27. *P. seorsus*.

Corolla glandular-pubescent within, the limb ample.

28. *P. Gairdneri*.

Subsection d. DEUSTI.

Corolla externally glandular, often glandular-puberulent but never pilose within, white or ochroleucus; seed-coat thin, tight-fitting.

Leaves all opposite, the blades elliptic to lanceolate or oblanceolate, mostly acute and sharply serrate; inflorescence unbranched.

29. *P. deusti*.

Leaves usually ternate or irregular, sometimes opposite, the blades linear-lanceolate to spatulate, less sharply serrate to entire; inflorescence usually branched.

30. *P. variabilis*.

Corolla externally glabrous, pilose within on lower lip, pink; seed-coat thick, spongy.

31. *P. Tracyi*.

Subsection e. ARENARI.

Represented by a single species.

32. *P. albomarginatus*.

Section 2. ERICOPSIS.

Herbage cinereous-puberulent throughout in ours; stems 15 cm. or less tall; corolla tubular-funnelform, the limb not oblique, the lips not longer than the width of the throat.

Densely caespitose; corolla 2-ridged on floor of throat, the upper lip erect, the lower lip spreading; leaves spatulate-oblong.

Subsection f. CAESPITOSI.

Stems erect from a woody branched but not creeping caudex; corolla not plicate within throat, the lips about equal and spreading.

Subsection g. LINARIOIDES.

Herbage glabrous throughout in ours; stems 25–60 cm. tall; corolla salverform, the oblique limb with lips three times as long as the width of the throat.

Subsection h. AMBIGUI.

Subsection f. CAESPITOSI.

Represented by a single species.

33. *P. Thompsoniae*.

Subsection g. LINARIOIDES.

Represented by a single species.

34. *P. californicus*.

Subsection h. AMBIGUI.

Represented by a single species.

35. *P. Thurberi*.

Section 3. AURATOR.

Corolla pinkish or reddish; staminode included; ovary glabrous.

Anther-sacs not explanate, 1.3 mm. long; corolla 14–20 mm. long, somewhat ventricose.

36. *P. monoensis*.

Anther-sacs explanate, 0.5 mm. long; corolla 11–14 mm. long, narrowly tubular.

37. *P. calcareus*.

Corolla lavender to purple or bluish; staminode exserted.

Ovary and capsule glabrous; staminode densely bearded with short stiffish deep orange hairs.

38. *P. miser*.

Ovary and capsule glandular-puberulent apically; staminode densely bearded with long soft yellow hairs or rarely glabrate.

Anther-sacs peltately explanate, as broad as long, the line of contact long.

39. *P. eriantherus*.

Anther-sacs not explanate, much longer than broad, the line of contact short.

40. *P. Whitedii*.

Section 4. HABROANTHUS.

Anther-sacs 1.3–1.5 mm. long, straight or crescentic but never sigmoid-curved, opening nearly throughout; corolla 22–27 mm. long.

41. *P. payettensis*.

Anther-sacs 2–2.4 mm. long, sigmoid-curved, opening partially; corolla 26–32 mm. long.

Upper cauline leaves linear-lanceolate; anther-sacs glabrous in ours.

42. *P. speciosus*.

Upper cauline leaves narrowly ovate to cordate-amplexicaul; anther-sacs hirtellous on the sides.

43. *P. Pennellianus*.

Section 5. ANULARIUS.

Represented by a single species.

44. *P. acuminatus*.

Section 6. PELTANTHERA.

Leaves serrate or dentate (if entire, the corolla ventricose and not reddish); corolla usually ventricose and 2-lipped, never scarlet; usually suffrutescent at base.

Subsection i. SPECTABILES.

Leaves entire; corolla tubular, subregular, scarlet to carmine or rose-lavender; herbaceous throughout.

Subsection j. CENTRANTHIFOLII.

Subsection i. SPECTABILES.

Corolla abruptly inflated from a short tube about equaling the calyx, strongly 2-lipped, white, tinged with pink, lavender, or purple, mostly 12 mm. or more wide; staminode long-bearded, uncinately.

Leaves obviously dentate, lance-ovate; inflorescence glandular; stems unbranched.

Upper leaves connate-perfoliate, glaucous; ovary usually glandular-puberulent; thyrsus virgate.

45. *P. Palmeri*.

Upper leaves distinct, usually bright green; ovary glabrous; thyrsus lax.

46. *P. Grinnellii*.

Leaves essentially entire and linear; inflorescence glabrous; stems freely branched.

47. *P. fruticiformis*.

Corolla nearly tubular to inflated from tube twice longer than calyx, not whitish; staminode short-bearded or glabrous, not uncinat.

Anther-sacs peltately explanate and glabrous; thyrsus virgate, secund; corolla pink to rose-purple.

Corolla obviously 2-lipped and strongly inflated (except in subsp.), more than 10 mm. wide (except in subsp.); leaves glaucous. 48. *P. floridus*.

Corolla nearly regular and tubular-funnelform, 4-8 mm. wide; leaves green or glaucous.

Calyx 4-6 mm. high; corolla moderately ampliate, 5-8 mm. wide.

Leaves thin, glaucous, dentate; corolla rose-purple, with dark guide lines; stems to 10 dm. tall. Eastern California. 49. *P. pseudospectabilis*.

Leaves thick, green or glaucous, entire or dentate; corolla crimson or red-purple, without guide lines; stems to 7 dm. tall. Western border of California deserts. 50. *P. Clevelandii*.

Calyx 3-4.5 mm. high; corolla essentially tubular, 4-5 mm. wide. Eastern Mojave Desert. 51. *P. Stephenii*.

Anther-sacs not explanate, more or less scabro-ciliate at suture; thyrsus lax (the peduncles divaricate); corolla purplish with blue limb, obviously 2-lipped.

Leaves narrowly linear-lanceolate and mostly entire; staminode bearded.

Leaves broader, the upper connate-perfoliate, coarsely serrate; staminode glabrous. 52. *P. incertus*.

53. *P. spectabilis*.

Subsection *j*. CENTRANTHIFOLIUS.

Corolla glabrous, scarlet, tubular.

Corolla carmine to rose-lavender.

Thyrsus racemiform; corolla glandular-pubescent, carmine; anther-sacs peltately explanate. 54. *P. centranthifolius*.

55. *P. utahensis*.

Thyrsus open and often decompound; corolla glabrous, rose-lavender; anther-sacs boat-shaped.

56. *P. confusus*.

Section 7. ELMIGERA.

Corolla obscurely 2-lipped, the short round lobes scarcely spreading.

57. *P. Eatonii*.

Corolla strongly 2-lipped, the galeate upper lip erect, the linear lobes of the lower lip sharply reflexed.

58. *P. labrosus*.

Subgenus II. SACCANTHERA.

Section 8. EUSACCANTHERA.

Leaves entire; staminode usually glabrous. Mostly California and adjacent borders.

Subsection *k*. HETEROPHYLLI.

Leaves serrulate to parted; staminode bearded. Northern Oregon northward.

Subsection *l*. SERRULATI.

Subsection *k*. HETEROPHYLLI.

Staminode bearded; inflorescence glandular-pubescent.

Anthers 1 mm. long; leaves glabrous; corolla 13-16 mm. long.

59. *P. gracilentus*.

Anthers 1.5 mm. or more long; leaves canescent; corolla 24-35 mm. long.

Calyx-lobes linear-lanceolate, attenuate; corolla-throat rounded and glabrous within; leaves evenly distributed. 60. *P. papillatus*.

Calyx-lobes broadly ovate, acute; corolla-throat 2-ridged and villous within; leaves mostly basal.

61. *P. scapoides*.

Staminode glabrous.

Leaves mostly basal; orifice of corolla bearded ventrally.

62. *P. caesius*.

Leaves well distributed; orifice of corolla glabrous.

Anthers purple-black, more or less truncate, dehiscent for less than half the length of sacs. Northern Oregon. 63. *P. Cusickii*.

Anthers buff to purplish, rounded or pointed, dehiscent for half or more the length of sacs. Southern Oregon to California.

Herbage glabrous to finely pubescent; basal leaves narrowly oblanceolate to obovate.

Inflorescence glandular-pubescent; peduncles divergent.

Leaves not glaucous; corolla blue-purple.

Leaves linear to oblong or oblanceolate, 2-12 mm. wide, not involute, pubescent to glabrate, without fascicles developing in the axils. 64. *P. laetus*.

Leaves filiform, 0.5-1.5 mm. wide, tightly involute, essentially glabrous, often with fascicles developing in the axils. 65. *P. filiformis*.

Leaves glaucous, glabrous; corolla usually tricolored.

66. *P. neotericus*.

Inflorescence not glandular; peduncles appressed.

Leaves just below inflorescence amplexicaul, blue-glaucous, glabrous.

Corolla 18-30 mm. long; anthers 1.75-3.25 mm. long.

67. *P. azureus*.

Corolla 14-20 mm. long; anthers 1.4-1.8 mm. long.

68. *P. parvulus*.

Leaves just below inflorescence narrow at base, sessile, rarely glaucous, puberulent or glabrous. 69. *P. heterophyllus*.

Herbage densely canescent; basal leaves oval to rotund.

70. *P. Purpusii*.

Subsection *l*. SERRULATI.

Glandular-pubescent only in the inflorescence if at all; staminode bearded.

Inflorescence never glandular; staminode included.

Corolla-lobes and fertile filaments glabrous.

71. *P. serrulatus*.

Corolla-lobes ciliate; fertile filaments pilose above.

72. *P. venustus*.

Inflorescence glandular-pubescent; staminode exerted.

Corolla pink, mostly 18-30 mm. long; leaves opposite.

73. *P. Richardsonii*.

Corolla blue-lilac, mostly 12-15 mm. long; leaves ternate.

74. *P. triphyllus*.

Glandular-pubescent throughout; staminode glabrous.

75. *P. glandulosus*.

Section 9. EMERSUS.

A single species.

76. *P. Bridgesii*.

Subgenus III. CRYPTOSTEMON.

A single species.

77. *P. personatus*.

Subgenus IV. DASANTHERA.

Low shrubs with mostly erect or decumbent stems 20 cm. or more tall.

Leaves blue-glaucous, broadly oval, to 6 cm. long; corolla 35–40 mm. long, lilac; inflorescence glabrous.

78. *P. Barrettae*.

Leaves not glaucous, smaller; inflorescence glandular-pubescent (rarely glabrate).

Corolla bluish or purple.

Leaves linear-lanceolate to elliptic, acute, entire or somewhat serrate; corolla lavender-violet. East of the crest of the Cascades.

79. *P. fruticosus*.

Leaves oblong-elliptic to oval, obtuse, obviously toothed; corolla bright purple. West of the crest of the Cascades.

80. *P. Cardwellii*.

Corolla rose-red or amaranth purple. California.

81. *P. Newberryi*.

Cespitose mats mostly 10 cm. or less tall.

Corolla rose; leaves glaucous, often more or less hirtellous, serrate.

82. *P. rupicola*.

Corolla blue-violet; leaves green, glabrous, entire or serrate.

83. *P. Menziesii*.

Subgenus V. NOTHOCHELONE.

Represented by a single species.

84. *P. nemorosus*.

Subgenus VI. HESPEROTHAMNUS.

Corolla whitish, yellowish, or fulvous, not distinctly tubular.

Inflorescence spicate-racemose; pedicels shorter than calyces; flowers solitary or geminate.

85. *P. Rothrockii*.

Inflorescence paniculate or thyrsoid; pedicels longer than calyces; flowers usually geminate or several.

Staminode glabrous; corolla white tinged with pink, long-hirsute externally.

86. *P. breviflorus*.

Staminode densely bearded; corolla short-pubescent externally.

Corolla about 4 mm. wide, fulvous with yellowish lower lip; stems glaucous; leaves denticulate.

87. *P. Lemmonii*.

Corolla about 10 mm. wide, yellow; stems not glaucous; leaves usually entire.

88. *P. antirrhinoides*.

Corolla red, distinctly tubular.

Leaves opposite, narrowly elliptic to narrowly cordate; stems not glaucous.

Staminode bearded only apically; leaves mostly subcordate; scandent shrub.

89. *P. cordifolius*.

Staminode bearded throughout; leaves tapering to base; not scandent.

90. *P. corymbosus*.

Leaves ternate, linear-lanceolate; stems glaucous.

91. *P. ternatus*.1. *Penstemon procerus* Dougl. Small-flowered *Penstemon*. Fig. 4638.*Penstemon procerus* Dougl. ex. R. Grah. Edinb. New Phil. Journ. 7: 348. 1829.*Penstemon micranthus* Nutt. Journ. Acad. Phila. 7: 45. 1834.*Penstemon confertus* var. *caeruleo-purpureus* A. Gray, Proc. Amer. Acad. 6: 72. 1862.*Penstemon confertus* var. *procerus* Coville, Contr. U.S. Nat. Herb. 4: 169. 1893.*Penstemon procerus* var. *micranthus* M. E. Jones, Bull. Univ. Mont. Biol. Ser. 15: 45. 1910.

Stems slender, 1–4(–7) dm. high, the herbage essentially glabrous, the basal rosette feebly developed. Leaves deep green, thin, the basal lanceolate to oblanceolate, 2–6 cm. long including the short slender petiole, the cauline broadly oblong to narrowly lanceolate; thyrsus strict, of 1–6 dense clusters, the lower often well spaced; calyx-lobes 3–6 mm. long, elliptic to obovate, scarious-margined but quite entire, with caudate tip equaling or exceeding basal portion; corolla blue-purple, sparingly to considerably bearded on palate, the limb spreading; anther-sacs 0.4–0.7 mm. long; staminode included, with few short yellow hairs at apex. $n = 8$, 16.

Common on meadow borders or on drier openly timbered slopes, Transition and Canadian Zones; southern Alaska to eastern Washington and Oregon, and east to Wyoming and southern Colorado. Type locality: northwestern North America. May–Aug.

2. *Penstemon Tolmiei* Hook. Alpine *Penstemon*. Fig. 4639.*Penstemon Tolmiei* Hook. Fl. Bor. Amer. 2: 98. 1838.

Stems slender, 0.5–1.5 dm. high, the basal rosette well-developed, glabrous throughout. Leaves deep green, rather firm, the basal lanceolate to elliptic, 1.5–5 cm. long including the short slender petiole, the cauline lance-oblong, amplexicaul; thyrsus usually reduced to a single cluster; calyx 3–5 mm. high, the lobes usually caudate-tipped, if merely sharply acute then very scarious, lacerate, and elongated; corolla deep blue-purple or sometimes pale yellow, 9–11 mm. long, somewhat ampliate, the lower lip larger than the upper, the palate densely bearded, the limb spreading; anther-sacs 0.5 mm. long; staminode included, well bearded. $n = 8$.

Rocky or meadowy slopes, Hudsonian and Arctic-Alpine Zones; western British Columbia south to Mount Adams, Washington. Type locality: Mount Rainier. June–Aug.

Penstemon Tolmiei subsp. *formosus* (A. Nels.) Keck, Amer. Midl. Nat. 33: 147. 1945. (*Penstemon formosus* A. Nels. Proc. Biol. Soc. Wash. 17: 100. 1904; *P. chionophilus* Greene, Leaflets Bot. Obs. 1: 161. 1906; *P. cacuminis* Pennell, Notulae Naturae No. 71: 2. 1941.) Densely cespitose; stems 0.4–1.5 dm. high, their leaves much reduced; basal leaves with ovate blades only 1 cm. long, or rarely much narrower and folded;

calyx 1.7–2.7 mm. high, the lobes obtuse to cuspidate-tipped; thyrsus of 1–2 dense clusters; corolla 7.5–11 mm. long, tubular, the palate lightly bearded to glabrate; staminode glabrous to lightly bearded. Alpine peaks of the Wallowa Mountains, Oregon, of the Marble Mountains and Mount Eddy and of the central Sierra Nevada, California, and of the Mount Rose region, Nevada. Type locality: summits, Blue Mountains, Oregon.

Penstemon Tolmiei subsp. *brachyanthus* (Pennell) Keck, op. cit. 148. (*Penstemon brachyanthus* Pennell, Notulae Naturae No. 71: 3. 1941.) Stems 1.5–3 dm. high, prominently leafy; thyrsus of 3–5 interrupted clusters, sometimes reduced to one; calyx 2–3 mm. high, the lobes usually cuspidate-tipped and with prominently scarious erosulate margin; corolla 7–11 mm. long, tubular or nearly so, the palate lightly bearded; staminode bearded. Mount Hood, Oregon, southward through the Cascades to the Salmon and Trinity Alps, California. Type locality: Cloud Cap Inn, Mount Hood, Oregon.

3. *Penstemon cinicola* Keck. Ash Penstemon. Fig. 4640.

Penstemon cinicola Keck, Carnegie Inst. Wash. Pub. No. 520: 294. 1940.

Penstemon truncatus Pennell, Notulae Naturae No. 71: 5. 1941.

Stems slender, numerous, forming clumps 1.5–3.5 dm. high, the herbage glabrous or minutely puberulent, no basal rosette developed. Leaves green or grayish, not glaucous, narrowly linear-lanceolate, folded and somewhat recurved, 2.5–5.5 cm. long; thyrsus strict, virgate, of 2–7 clusters, the lower well spaced and on very slender erect peduncles; calyx 1.4–2 mm. high, the lobes obovate-oblong, truncate or mucronate, with broad scarious subentire margin; corolla purple with deep blue spreading limb, 7–9 mm. long, the obscurely ridged palate moderately bearded; anther-sacs 0.35–0.5 mm. long; staminode included, with few short hairs apically. $n = 8, 16$.

Largely confined to dry volcanic sands, principally in the Arid Transition Zone; Deschutes County, Oregon, to Lassen County, California. Type locality: Lapine, Deschutes County, Oregon. June–Aug.

4. *Penstemon Péckii* Pennell. Peck's Penstemon. Fig. 4641.

Penstemon Peckii Pennell, Notulae Naturae No. 71: 12. 1941.

Habit of *P. cinicola*, the very slender stems 2.5–5(–7) dm. high. Leaves deep green, the basal narrowly lanceolate, tapering to apex and slender petiole, 2–5 cm. long, the cauline linear-lanceolate; thyrsus finely glandular-pubescent, strict, virgate, of 2–5(–9) moderately congested clusters; calyx 1.7–3.3 mm. high, the lobes broadly lanceolate to ovate, acute to acuminate, with scarious subentire margin; corolla pale purplish blue to white, 8–10 mm. long, the limb expanded, the low-ridged palate moderately pilose; anther-sacs 0.4–0.5 mm. long; staminode like *P. cinicola*.

Sandy soils, open pine woods, Arid Transition Zone; eastern slope of the Cascade Range, Oregon, from Mount Hood to Three Sisters. Type locality: 9 miles northwest of Sisters, Deschutes County. June–July.

5. *Penstemon washingtonensis* Keck. Washington Penstemon. Fig. 4642.

Penstemon washingtonensis Keck, Amer. Midl. Nat. 33: 150. 1945.

Stems slender, 1.2–2.4 dm. high, puberulent in lines to glabrate, the basal rosette well developed. Leaves deep green, glabrous, the basal lanceolate to oblanceolate, 2.5–5.5 cm. long including the slender petiole, the cauline lance-oblong; thyrsus glandular-pubescent, of 1–3 rather crowded many-flowered clusters; calyx 4–6 mm. high, the lobes lance-oblong with caudate tip and prominently scarious more or less erose margin; corolla deep blue-purple (rarely yellowish), 9–11 mm. long, nearly tubular, densely bearded at palate; anther-sacs ovate to orbicular, 0.5–0.6 mm. long; staminode included, bearded feebly to heavily with short hairs at apex or for one-third its length.

Moist flats and timbered slopes, Canadian Zone; western Okanogan and northern Chelan Counties, Washington. Type locality: "junction of Nelson Butte and Copper Mountain roads, north of Lake Chelan, Chelan County." July.

6. *Penstemon oreócharis* Greene. Meadow Penstemon. Fig. 4643.

Penstemon oreocharis Greene, Leaflets Bot. Obs. 1: 163. 1906.

Penstemon interruptus Greene, loc. cit.

Penstemon washoensis Greene, loc. cit.

Penstemon lassenianus Greene, op. cit. 164.

Penstemon productus Greene, op. cit. 166.

Penstemon recurvatus Heller, Muhlenbergia 2: 247. 1906.

Penstemon tinctus Pennell, Notulae Naturae No. 71: 6. 1941.

Stems 2–5(–7) dm. high, the herbage bright green and essentially glabrous, the basal rosette well developed. Leaves thin, the basal linear-oblong to elliptic, 3–10 cm. long including the slender petiole, the cauline oblong or lance-oblong, the upper amplexicaul; thyrsus strict, of 1–6 rather distinct many-flowered clusters; calyx 3–5(–7.5) mm. high, the oblong lobes abruptly narrowed to the acuminate tip, with narrow to broad usually entire scarious margin; corolla 10–13(–15) mm. long, the lips equal, the palate prominently bearded; anther-sacs 0.55–0.85 mm. long; staminode reaching orifice, usually densely bearded with long golden hairs for outer half its length or only apically, rarely glabrous. $n = 8$.

Wet or dry meadows, lower Arid Transition Zone to Hudsonian Zone; Washington (Kittitas County) southward, mostly east of the Cascades, to Inyo and Fresno Counties, California; local in the Coast Range in Glenn County, California; east to western Idaho and northern Nevada. Type locality: Pine Ridge, Fresno County, California. May–Aug.



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4637. *Verbascum Thapsus*
 4638. *Penstemon procerus*
 4639. *Penstemon Tolmiei*

4640. *Penstemon cinicola*
 4641. *Penstemon Peckii*
 4642. *Penstemon washingtonensis*

4643. *Penstemon oreocharis*
 4644. *Penstemon hesperius*
 4645. *Penstemon Vaseyanus*

7. *Penstemon hesperius* Peck. Tall Western Penstemon. Fig. 4644.

Penstemon hesperius Peck, *Torreya* 32: 152. 1932.

Stems 5-8(-12) dm. high, the herbage bright green and glabrous or becoming rather densely hirtellous toward the inflorescence, the basal rosette moderately developed. Leaves thin, the basal narrowly elliptic, 4-9 cm. long including the short petiole, the cauline becoming amplexicaul; thyrsus strict, of 3-4 more or less confluent many-flowered clusters; calyx 4-7(-9) mm. high, the lobes mostly ovate with caudate-attenuate appendage equaling or exceeding the body, or lanceolate throughout, the margin variable; corolla 12-14 mm. long, the palate prominently bearded; anther-sacs broadly ovate, 0.7-0.8 mm. long; staminode reaching orifice, densely bearded apically with long golden hairs.

Boggy meadows, Humid Transition Zone; along the lower Columbia River, Washington, and in the lower Willamette Valley, Oregon (Washington and Clackamas Counties). Type locality: Gaston, Washington County, Oregon. June-July.

8. *Penstemon Vaseyanus* Greene. Vasey's Penstemon. Fig. 4645.

Penstemon ellipticus Greene, *Leaflets Bot. Obs.* 1: 167. 1906. Not Coult. & Fisher, 1893.

Penstemon Vaseyanus Greene, *op. cit.* 200.

Stems 2-5 dm. high, the herbage bright green and glabrous, the basal rosette well developed. Leaves thin, entire, or occasionally one or two pairs obscurely denticulate, the basal elliptic, 3-12 cm. long including the slender petiole, the cauline broadly oblong or lance-oblong, the upper cordate-clasping; thyrsus of 1-5 many-flowered clusters; calyx 4-7.5 mm. high, the linear-oblong to lance-ovate lobes tapering to the fleshy acuminate more or less uncinat tip half as long to as long as the body, the prominent margin subentire; corolla 11-15 mm. long, gradually amplate, to 5 mm. wide, rather obviously bilabiate, the limb expanded or the upper lip erect, the palate prominently white-bearded; anther-sacs and staminode like those of *P. hesperius*.

Meadowy places in open sagebrush or on forested slopes, Arid Transition Zone; south central Washington, from Kittitas County to Klickitat County. Type locality: Washington. June-Aug.

9. *Penstemon pratensis* Greene. White-flowered Penstemon. Fig. 4646.

Penstemon pratensis Greene, *Leaflets Bot. Obs.* 1: 165. 1906.

Stems slender to rather stout, 2.5-5 dm. high, the herbage light green and glabrous, the basal rosette developed. Leaves thin, the basal linear-oblong to elliptic, 3-8 cm. long including the short or elongated petiole, the lower cauline up to 9 cm. long and 18 mm. wide, the upper amplexicaul; thyrsus strict, virgate, of 2-5 clusters; calyx 4-7 mm. high, the lobes lanceolate to oblong with short acuminate tip, the narrow margin entire or moderately erose above; corolla white (the buds tipped with yellow), 11-14 mm. long, nearly tubular to obviously amplate, the palate bearded with long yellowish hairs; anther-sacs ovate, 0.65-0.75 mm. long; staminode reaching orifice, densely bearded apically with long golden hairs. $n = 16$.

In moist meadows or stream borders in sagebrush or aspen, Upper Sonoran Zone to Canadian Zone; Steen Mountains, Oregon, to southwestern Idaho and northeastern Nevada. Type locality: Deeth, Nevada. June-July. This tetraploid species appears much like a white-flowered counterpart of the blue-flowered *P. oreocharis*, a diploid species.

10. *Penstemon globosus* (Piper) Pennell & Keck. Globe Penstemon. Fig. 4647.

Penstemon confertus var. *globosus* Piper, *Bull. Torrey Club* 27: 397. 1900.

Penstemon globosus Pennell & Keck, *Carnegie Inst. Wash. Pub.* No. 520: 294. 1940.

Stems slender to stout, 2.5-4(-6.5) dm. high, the herbage bright green and glabrous, the basal rosette well developed. Leaves thin, the basal lanceolate, 5-18 cm. long including the long slender petiole, the cauline lanceolate or oblong to ovate, obtuse or acute, amplexicaul or even cordate-clasping; thyrsus usually reduced to a single dense many-flowered subcapitate cluster, or of 2-4 clusters, the upper crowded, the lower more remote and on erect peduncles up to 5 cm. long; calyx 5.5-8(-10) mm. high, the oblong or obovate lobes abruptly narrowed to the lance-subulate tip, the margin prominently scarious and usually erose; corolla bright blue or blue-purple, (13-)15-20 mm. long, gradually amplate, to 7 mm. wide, the palate slightly to prominently bearded; anther-sacs oval, pouch-like, not dehiscent quite to the free end nor through the partition, denticulate-ciliolate, 0.7-0.9 mm. long; staminode included, densely bearded for half its length with golden yellow hairs. $n = 16$.

In boggy meadows, or sometimes in drier grassy or gravelly slopes, Arid Transition and Canadian Zones; Wallowa Mountains, Oregon, east to central Idaho. Type locality: "Wallowa Mts., northeastern Oregon." May-Aug.

11. *Penstemon euglaucus* English. Glaucous Penstemon. Fig. 4648.

Penstemon euglaucus English, *Proc. Biol. Soc. Wash.* 41: 197. 1928.

Stems slender to rather stout, 1.5-5 dm. high, the herbage glabrous and more or less glaucous throughout, the rosette well developed. Leaves rather firm, the basal narrowly to broadly elliptic, tapering to a short petiole, 4-10 cm. long, the cauline linear-oblong to lance-ovate; thyrsus strict, of 1-5 more or less remote many-flowered clusters; calyx 3.5-5 mm. high, the lobes broadly oblong-obovate with an abrupt caudate tip half as long as the body, the prominent scarious margin more or less erose; corolla deep blue, 11-15 mm. long, moderately amplate, the palate lightly yellow-bearded; anther-sacs narrowly ovate, dehiscent throughout but not

explanate, 0.5–0.7 mm. long; staminode reaching orifice, lightly to rather densely tufted at apex with short golden hairs. $n = 24$.

On volcanic ash, in forest openings, Transition and Canadian Zones; Cascade Range, from Mount Adams, Washington, to Three Sisters, Oregon. Type locality: Blue Grass Ridge, Mount Hood. June–Sept.

12. *Penstemon heterodoxus* A. Gray. Sierran *Penstemon*. Fig. 4649.

Penstemon heterodoxus A. Gray, Syn. Fl. N. Amer. 2^d: 269. 1878.

Penstemon geniculatus Greene, Pittonia 3: 310. 1898.

Penstemon alsinoides Greene, Leaflets Bot. Obs. 1: 162. 1906.

Penstemon depressus Greene, loc. cit.

Penstemon procerus f. *geniculatus* Smiley, Univ. Calif. Pub. Bot. 9: 325. 1921.

Penstemon confertus var. *geniculatus* Jepson, Man. Fl. Pl. Calif. 914. 1925.

Stems slender, mostly 8–15(–25) cm. high, the basal rosette developed. Leaves deep green, thin, glabrous, the basal linear-oblancoate to spatulate, 1–4 cm. long including the very slender petiole as long as blade, 4–8 mm. wide, the cauline oblanceolate to spatulate-oblong below and narrowly to broadly lanceolate above, up to 3 cm. long and 8 mm. wide; thyrsus usually reduced to a subcapitate cluster, or of 2–4 distinct clusters, dense, very glandular; calyx 3–6 mm. high, the oblong lobes abruptly narrowed to the short acute tip; corolla deep blue-purple, 10–16 mm. long, gradually amplate, the palate prominently brownish-yellow-bearded; anther-sacs broadly ovate, boat-shaped, rarely explanate, 0.7–1 mm. long; staminode included, bearded with short stiff yellow hairs apically or sometimes glabrous. $n = 8$.

Rocky slopes and alpine meadows, Hudsonian and Arctic-Alpine Zones; Sierra Nevada of California from Plumas County to Mount Whitney; White Mountains; adjacent Nevada. Type locality: "High mountain near Donner Pass, in the Sierra Nevada, California." July–Aug.

Penstemon heterodoxus subsp. *cephalophorus* (Greene) Keck, Amer. Midl. Nat. 33: 165. 1945. (*Penstemon cephalophorus* Greene, Leaflets Bot. Obs. 1: 79. 1904; *P. glastifolius* Greene, op. cit. 162. 1906.) Stems stouter, mostly 15–40 cm. high; basal leaves 3–7 cm. long, 6–12 mm. wide, the middle cauline up to 6 cm. long and 12 mm. wide. Southern Sierra Nevada in Fresno and Tulare Counties largely to the west of the Kern River; at lower elevations than the typical form. Type locality: Summit Lake, Tulare County, California.

13. *Penstemon shastensis* Keck. Shasta *Penstemon*. Fig. 4650.

Penstemon shastensis Keck, Amer. Midl. Nat. 33: 165. 1945.

Stems slender to rather stout, 2–5 dm. high, the basal rosette well developed. Leaves deep green, rather thin, glabrous, the basal elliptic, obtuse, 3–6 cm. long including the long narrow petiole, the lower cauline the largest, lance-oblong, up to 9 cm. long and 16 mm. wide; thyrsus of 2–6 dense clusters or sometimes reduced to one, moderately glandular-pubescent; calyx 2.5–5 mm. high, the lance-oblong lobes not abruptly tipped, acuminate; corolla blue-purple, 10–13 mm. long, like *heterodoxus*; anther-sacs ovate, boat-shaped, 0.6–0.7 mm. long; staminode reaching orifice, densely golden bearded at apex. $n = 16$.

In meadows, Transition and Canadian Zones; California, Siskiyou and adjacent Modoc Counties to Shasta County. Type locality: Grass Lake, Siskiyou County. June–July. This tetraploid species was formerly confused with the diploid *P. heterodoxus*.

14. *Penstemon glaucinus* Pennell. Blue-leaved *Penstemon*. Fig. 4651.

Penstemon glaucinus Pennell, Notulae Naturae No. 71: 10. 1941.

Stems slender, 3–3.5 dm. high, the herbage glaucous, the basal rosette well developed. Leaves thickish, the basal elliptic to broadly spatulate, 2–6 cm. long including the slender petiole, 7–13 mm. wide, the cauline broadly oblong to lance-oblong; thyrsus glandular-pubescent, of 2–4 more or less remote clusters; calyx 3.5–6 mm. high, the lanceolate to ovate-oblong lobes attenuate, the entire or erosulate margin prominently scarious; corolla blue-purple, 12–15 mm. long, gradually amplate, the limb expanded or upper lip erect, the palate moderately bearded with prominent yellow hairs; anther-sacs ovate, boat-shaped, 0.65–0.95 mm. long; staminode included, densely bearded with short golden hairs or glabrous.

Lodgepole pine forest, Canadian Zone; Campbell Lake, east of Gearhart Mountain, Lake County, Oregon (the type locality), and south slope of Gearhart Mountain, both known collections made by E. I. Applegate. July.

15. *Penstemon attenuatus* Dougl. Taper-leaved *Penstemon*. Fig. 4652.

Penstemon attenuatus Dougl. ex. Lindl. Bot. Reg. 15: pl. 1295. 1829.

Penstemon propinquus Greene, Leaflets Bot. Obs. 1: 166. 1906.

Penstemon confertus var. *attenuatus* M. E. Jones, Contr. West. Bot. No. 12: 62. 1908.

Penstemon Nelsonae Keck & Thoms. Rhodora 37: 419. 1935.

Stems rather slender, 3–6(–9) dm. high, the basal rosette well developed. Leaves deep green, usually entire or sometimes finely denticulate, glabrous, the basal linear-lanceolate to oval, 4–10(–17) cm. long including the slender petiole, 7–20(–45) mm. wide, the cauline gradually or abruptly reduced, the upper amplexicaul; thyrsus glandular-pubescent, strict, of 3–7 clusters; calyx 4–7 mm. high, the lobes mostly lanceolate, with relatively narrow and entire scarious margin; corolla pale yellow or blue-purple to violet, mostly 14–20 mm. long, amplate, rather obviously bilabiate, the palate bearded with whitish hairs; anther-sacs ovate, boat-shaped, dehiscent through the connective and quite to the apex, mostly 0.8–1.2 mm. long; staminode reaching orifice, bearded with relatively long golden hairs toward apex. $n = 24$.

Openings in pine woods, Arid Transition Zone; central and eastern Washington (Chelan and Spokane

Counties) southward through the Blue Mountains of Oregon, east to Idaho. Type locality: Craig Mountains, Idaho. June–Aug.

Penstemon attenuatus subsp. *palustris* (Pennell) Keck, Amer. Midl. Nat. 33: 171. 1945. (*Penstemon palustris* Pennell, Notulae Naturae No. 71: 8. 1941.) Corolla blue-purple, only 7–10 mm. long; calyx-lobes correspondingly short; anther-sacs 0.6–0.7 mm. long. Marshy places in the southern Blue Mountains, Oregon (Baker and Grant Counties). Type locality: John Day River at Prairie City, Oregon.

16. *Penstemon spathulatus* Pennell. Wallowa *Penstemon*. Fig. 4653.

Penstemon spathulatus Pennell, Notulae Naturae No. 71: 10. 1941.

Stems slender, 1–2.5 dm. high, from an often wide matted base, the basal rosette well developed. Leaves rather firm, the basal narrowly elliptic to oval, obtuse or acute, 2–6 cm. long including slender petiole, 6–18 mm. wide, the cauline oblong-lanceolate; thyrsus moderately glandular-pubescent, of 1–4 rather crowded clusters; calyx 2.5–5 mm. high, the lance-oblong to broadly ovate lobes acuminate, with entire to erosulate narrow or broad scarious margin; corolla violet-blue, marked with guide lines within, 10–13 mm. long, gradually amplate, to 5 mm. wide, the palate moderately bearded; anther-sacs elliptic to ovate, boat-shaped, 0.6–0.8 mm. long; staminode reaching orifice, sparingly to densely golden bearded at apex.

Dry gravelly slopes, Hudsonian Zone; Wallowa Mountains, Wallowa County, Oregon. Type locality: Ice Lake, head of Adams Creek, Wallowa Mountains. July–Aug.

17. *Penstemon confertus* Dougl. Yellow *Penstemon*. Fig. 4654.

Penstemon confertus Dougl. ex Lindl. Bot. Reg. 15: pl. 1260. 1829.

Stems slender, 2–5(–7) dm. high, the green herbage essentially glabrous throughout, the basal rosette developed. Leaves thin, the basal lanceolate to oblanceolate, on short slender petioles, 3–7(–10) cm. long, up to 20 mm. wide, the cauline usually narrow, reduced within the inflorescence to broadly scarious-margined and erose bracts; thyrsus strict, of 2–7 dense clusters; calyx 3–5 mm. high, the lanceolate to broadly oblong lobes abruptly acuminate or subulate-tipped, very thin, the scarious margin usually much wider than the herbaceous portion and prominently erose; corolla pale sulphur-yellow, 8–12 mm. long, tubular, bilabiate, the palate well bearded with brown hairs; anther-sacs oval, explanate, 0.4–0.5 mm. long; staminode included, with short tuft of brownish hairs at apex. $n = 16$.

Meadowy places or forest openings, Arid Transition and Canadian Zones; British Columbia, south through Washington east of the Cascades to northeastern Oregon, east to Alberta and Montana. Type locality: "between Salmon River and the Kettle Falls in the Columbia," northeastern Washington. May–Aug.

18. *Penstemon humilis* Nutt. Lowly *Penstemon*. Fig. 4655.

Penstemon humilis Nutt. ex A. Gray, Proc. Amer. Acad. 6: 69. 1862.

Penstemon collinus A. Nels. Bull. Torrey Club 25: 279. 1898.

Penstemon puberulus M. E. Jones, Contr. West. Bot. No. 12: 64. 1908.

Stems densely caespitose, forming clumps 1–3 dm. high, the herbage cinereous-puberulent below, grayish, the basal rosette well developed. Leaves rather firm, entire, those of the rosette mostly lanceolate, tapering to petiole and apex, 2–5 cm. long, the cauline oblanceolate to oblong below, linear-lanceolate and rounded-amplexicaul above; thyrsus glandular-pubescent, of 3–6 more or less confluent few-flowered clusters; calyx 3–5 mm. high, the lobes broadly lanceolate to broadly ovate, obtuse to short-acuminate; corolla azure-blue to blue-lavender with purplish tube, 12–16 mm. long in ours, nearly tubular, the lower lip longer than the upper; anther-sacs ovate to rotund, more or less explanate, 0.4–0.6 mm. long; staminode reaching orifice, prominently tufted with golden hairs at apex and sparingly bearded for one-third its length.

Dry, sagebrush- or piñon-covered slopes, Upper Sonoran Zone; rare with us in Wallowa County, Oregon, and in eastern Mono County, California, more abundant eastward and northward to western Colorado and Wyoming and central Idaho. Type locality: Rocky Mountains. May–Aug.

19. *Penstemon cinereus* Piper. Gray *Penstemon*. Fig. 4656.

Penstemon cinereus Piper, Contr. U.S. Nat. Herb. 16: 209. 1913.

Stems slender, often anthocyanous, forming clumps 1–5 dm. high, the herbage cinereous-puberulent below the inflorescence, gray, the basal rosette well developed. Leaves rather firm, almost always entire (feebly toothed apically in some), those of the rosette lanceolate to narrowly ovate, acute or obtuse, mostly less than 5 cm. long and 8 mm. wide, the cauline abruptly reduced and nearly linear; thyrsus glandular-pubescent, of 3–9 distinct few-flowered clusters, the cymes rather lax and on short divergent or appressed peduncles; calyx 2–3 mm. high, the lobes ovate, obtuse or acute; corolla bright blue to blue-indigo or blue-purple, 9–13 mm. long, nearly tubular or gradually amplate; anther-sacs ovate to rotund, boat-shaped or nearly explanate, 0.5–0.6 mm. long; staminode reaching orifice, prominently bearded with short golden hairs for one-third its length. $n = 8$.

In volcanic gravels on sagebrush- or juniper-covered slopes, Arid Transition Zone; east of the Cascades from Wasco County, Oregon, south to Mount Shasta, east to northwestern Nevada. Type locality: Bend, Oregon. May–July.

Penstemon cinereus subsp. *foliatus* Keck, Amer. Midl. Nat. 33: 188. 1945. Herbage greener; rosette leaves mostly more than 5 cm. long and 8 mm. wide, the cauline only gradually becoming smaller and linear-oblong to oblong-lanceolate; calyx to 4 mm. high; corolla 12–16 mm. long; anther-sacs 0.7–0.8 mm. long; staminode bearded only at apex. In loamy or serpentine soils to the north and east of the typical form, from central Washington to the southern Blue Mountains, Oregon, east to Idaho. Type locality: Dixie Pass, Whitman National Forest, Grant County, Oregon.



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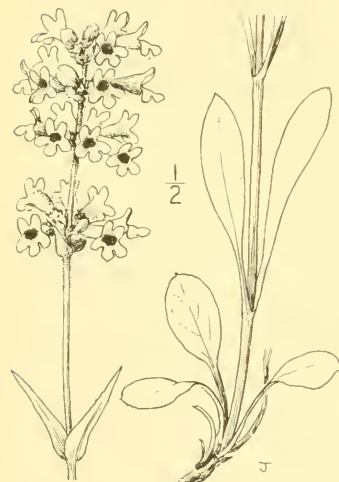
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4646. *Penstemon pratensis*
 4647. *Penstemon globosus*
 4648. *Penstemon euglaucus*

4649. *Penstemon heterodoxus*
 4650. *Penstemon shastensis*
 4651. *Penstemon glaucinus*

4652. *Penstemon attenuatus*
 4653. *Penstemon spatulatus*
 4654. *Penstemon confertus*



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4655. *Penstemon humilis*
 4656. *Penstemon cinereus*
 4657. *Penstemon elegantulus*

4658. *Penstemon ovatus*
 4659. *Penstemon prinosus*
 4660. *Penstemon subserratus*

4661. *Penstemon Wilcoxii*
 4662. *Penstemon anguineus*
 4663. *Penstemon Rattanii*

20. *Penstemon elegantulus* Pennell. Lonely Penstemon. Fig. 4657.

Penstemon elegantulus Pennell, Notulae Naturae No. 71: 14. 1941.

Stems slender, few to numerous from a compact crown, forming clumps 2-3 dm. high, the herbage finely puberulent or the leaves glabrate beneath, the basal rosette well developed. Leaves rather firm, sparingly serrate-denticulate, the basal narrowly elliptic-ovate, acute, 3-7 cm. long, 6-13 mm. wide, the cauline narrowly linear-lanceolate; thyrsus lightly glandular-pubescent, of 3-5 distinct few-flowered clusters, the somewhat lax cymules on short erect peduncles; calyx 3.5-4.5 mm. high, the elliptic-oblong to broadly ovate lobes acuminate, the moderately scarious margin erosulate; corolla violet-blue(?), 15-21 mm. long, 4.5-6.5 mm. wide pressed, gradually ampliate; anther-sacs ovate, boat-shaped, 0.75-1.2 mm. long; staminode bearded at tip with short golden yellow hairs.

Arid Transition Zone. "Cattle Camp at head of Horse Creek, Wallowa County, Oregon, alt. 5400 ft., collected in flower June 24, 1897, by E. P. Sheldon, no. 8387." Known only from this, the type collection, and from Joseph, Idaho.

21. *Penstemon ovatus* Dougl. Broad-leaved Penstemon. Fig. 4658.

Penstemon ovatus Dougl. ex Hook. Bot. Mag. 56: pl. 2903. 1829.

Stems several, hirtellous or glabrous below, 5-10 dm. high. Leaves bright green, glabrous to sparingly hirtellous, sharply serrate-dentate (rarely subentire), the basal broadly lanceolate to ovate, abruptly contracted to the short petiole, 5-15 cm. long, 1.5-4 cm. wide, the cauline triangular-ovate; thyrsus glandular-pubescent, of 4-10 rather loose clusters, the lower on divergent peduncles, the cymules simple or compound; calyx 2-5 mm. high, the lobes lanceolate to ovate; corolla deep blue or blue-purple, 15-22 mm. long, to 7 mm. wide, obviously ampliate and bilabiate, the lower lip exceeding the upper, the palate villous or rarely glabrous; anther-sacs broadly ovate, nearly explanate, 1 mm. long; staminode slightly exserted, prominently bearded for one-third its length or rarely glabrous. $n = 8$.

Damp rocky openings in the woods, Humid Transition and Canadian Zones; southern British Columbia, west of the Cascade crest, to Multnomah County, Oregon. Type locality: "High mountains about the Grand Rapids of the Columbia River." May-July.

22. *Penstemon pruinösus* Dougl. Chelan Penstemon. Fig. 4659.

Penstemon pruinösus Dougl. ex Lindl. Bot. Reg. 15: pl. 1280. 1829.

Penstemon amabilis G. N. Jones, Research Stud. St. Coll. Wash. 2: 126. 1930.

Stems clustered, 1-3(-6) dm. tall, the herbage variably viscid-puberulent throughout, sometimes rather densely cinereous below. Leaves serrate-denticulate, the basal lanceolate to ovate, 5-10 cm. long including the long slender petiole, 7-20(-35) mm. wide, the cauline oblong to lance-ovate; thyrsus prominently glandular-pubescent, of 3-7 rather loose many-flowered clusters, the peduncles strict; calyx 3-5 mm. high, the lanceolate to oblong lobes acuminate or acute; corolla deep blue-purple, 10-16 mm. long, 2-4 mm. wide pressed, the lower lip larger than the upper, the palate feebly bearded or glabrous; anther-sacs ovate to rotund, boat-shaped or nearly explanate, 0.5-0.7 mm. long; staminode reaching orifice, bearing a tuft of short yellow hairs at apex. $n = 8$.

Sagebrush land or pine-covered slopes, Arid Transition and Canadian Zones; southern British Columbia to central Washington, east of the summit of the Cascades. Type locality: "Near the Priest's rapid of the Columbia." May-July.

23. *Penstemon subserrätus* Pennell. Suberrate Penstemon. Fig. 4660.

Penstemon subserratus Pennell, Notulae Naturae No. 71: 13. 1941.

Stems clustered, 3-8 dm. high, the herbage light green, below the inflorescence glabrous or finely puberulent or sparingly glandular-pubescent. Leaves quite entire to sparingly and remotely serrate-denticulate, the basal elliptic, tapering to base and apex, 5-20 cm. long including the long slender petiole, 1-3 cm. wide, the cauline linear-oblong to deltoid-lanceolate; thyrsus glandular-pubescent, of 3-10 rather loose and remote clusters, the peduncles usually appressed; calyx 3-5 mm. high, the oblong to lance-ovate lobes acute or acuminate; corolla with deep blue limb and purple-blue throat, 11-15(-18) mm. long, 3-5 mm. wide pressed, the lips subequal; anther-sacs narrowly to broadly ovate, boat-shaped, denticulate-ciliolate, 0.8-1.1 mm. long; staminode reaching orifice, prominently golden-bearded at apex or sometimes for one-third its length. $n = 16$.

Dry open coniferous woods, Transition and Canadian Zones; east flank of the Cascade Range, from Yakima County, Washington, to Mount Hood, Oregon. Type locality: "Gotchen Creek Ranger Station, Columbia National Forest, Yakima County, Washington." June-July.

24. *Penstemon Wilcoxii* Rydb. Wilcox's Penstemon. Fig. 4661.

Penstemon Wilcoxii Rydb. Bull. Torrey Club 28: 28. 1901.

Penstemon ovatus var. *pinetorum* Piper in Piper & Beattie, Fl. Palouse Region 158. 1901.

Penstemon pinetorum Piper, Contr. U.S. Nat. Herb. 11: 500. 1906.

Penstemon leptophyllus Rydb. Fl. Rocky Mts. 773, 1066. 1917.

Stems mostly glabrous or obscurely puberulent below, 4-10 dm. high. Leaves pale to bright green, often thickish, usually glabrous, sometimes hirtellous beneath, sharply serrate-denticulate to subentire, the basal lanceolate to ovate, 4-20 cm. long including petiole, up to 5 cm. wide, the cauline lanceolate to broadly ovate; thyrsus lightly glandular-pubescent, of several contracted clusters, or more openly paniculate, with the ultimate cymules loosely decompound; calyx

2.5–5.5 mm. high, the lance-oblong to broadly ovate lobes acute to acuminate; corolla bright blue to bluish purple, 13–23 mm. long, 4–8 mm. wide pressed, more or less ampliate, the lower lip much exceeding the upper; anther-sacs ovate, more or less explanate, 0.75–1.0 mm. long; staminode slightly exerted, strongly yellow-bearded at apex or for half its length. $n = 8$, 16.

Dry coniferous woods, Arid Transition Zone; rare in Washington (Kamiak Butte; Blue Mountains); frequent in the Wallowa Mountains of Oregon, east to western Montana. Type locality: Kalispell, Montana. May–July.

25. *Penstemon anguineus* Eastw. Siskiyou *Penstemon*. Fig. 4662.

Penstemon Rattanii var. *minor* A. Gray, Proc. Amer. Acad. 15: 51. 1879.

Penstemon anguineus Eastw. Bull. Torrey Club 32: 208. 1905.

Penstemon minor Keck, Carnegie Inst. Wash. Pub. No. 520: 295. 1940.

Stems entirely glabrous below, 3–8 dm. high. Leaves glabrous, serrate to finely denticulate or almost entire, the basal oval to ovate, 5–15 cm. long including the petiole, 1–4 cm. wide, the lower cauline oblong, the upper triangular-ovate and cordate-amplexicaul; thyrsus sparingly to copiously glandular-pubescent, variable, of 3–10 dense congested clusters, or more openly paniculate with lower divergent peduncles up to 10 cm. long; calyx 4–7 mm. high, the lanceolate lobes entire; corolla deep lavender to blue-violet, with bright purple tube, 13–18 mm. long, 4–6 mm. wide pressed, rather abruptly ampliate, the short upper lip erect, the longer lower lip spreading, the palate sparingly bearded or glabrous; anther-sacs broadly ovate, nearly explanate, 0.8–1.1 mm. long; staminode exerted, sparsely bearded for half its length or glabrous. $n = 8$.

In chaparral or openings of coniferous forest on mountainsides or ridges, Transition and Canadian Zones; Crater Lake National Park, Oregon, southwestward to Humboldt and Glenn Counties, California. Type locality: Shelley Creek, Del Norte County, California. June–August.

26. *Penstemon Rattanii* A. Gray. Rattan's *Penstemon*. Fig. 4663.

Penstemon Rattanii A. Gray, Proc. Amer. Acad. 15: 50. 1879.

Stems often stout, entirely glabrous below, 3–12 dm. high. Leaves glabrous, undulate-serrate to shallowly but acutely dentate, the basal lanceolate to oval, 5–25 cm. long including the rather short stout petiole, 1–5 cm. wide, the cauline oblong, sessile, becoming cordate-amplexicaul above; thyrsus rather densely glandular-pubescent, of 2–7 clusters, foliose below, the lower peduncles divergent, 1–4 cm. long, the cymes rather lax; calyx 7–9 mm. high, accrescent, the lanceolate entire lobes attenuate or acute, equaling or exceeding the ripe fruit; corolla pale lavender to red-purple or violet-purple, the limb sometimes bluer, 24–30 mm. long, 8–10 mm. wide pressed, shaped like that of *P. anguineus*, the palate bearded; anther-sacs broadly ovate, nearly explanate, 1.25–1.4 mm. long; staminode well exerted, moderately long-bearded for half its length. $n = 8$.

Scattered colonies on grassy slopes and in woods, Humid Transition Zone; Lane County, Oregon, to Mendocino County, California. Type locality: Humboldt Ridge, Humboldt County, California. May–August.

Penstemon Rattanii subsp. *Kleei* (Greene) Keck, Carnegie Inst. Wash. Pub. No. 520: 295. 1940. (*Penstemon Kleei* Greene, Bull. Torrey Club 10: 127. 1883.) Calyx-lobes ovate-oblong, obtuse, 6–7 mm. long, considerably exceeded by the ripe fruit. Santa Cruz Mountains, California. Type locality: Ben Lomond, Santa Cruz County.

27. *Penstemon seorsus* (A. Nels.) Keck. Short-lobed *Penstemon*. Fig. 4664.

Penstemon linarioides var. *seorsus* A. Nels. Bot. Gaz. 54: 147. 1912.

Penstemon seorsus Keck, Amer. Midl. Nat. 23: 595. 1940.

Shrubby at base; stems numerous, erect, slender, 2–3 dm. high, rather densely clothed with opposite leaves, the herbage cinereous-puberulent. Leaves narrowly linear, entire, 2–3 cm. long, 1–2 mm. wide, the margin revolute; thyrsus subracemose, glandular-pubescent; calyx-lobes lanceolate to ovate-oblong, acute, narrowly scarious-margined, entire; corolla essentially tubular, blue-purple, 16–20 mm. long, 4–5 mm. wide, glabrous within, the lobes short; anther-sacs oblong, cymbiform; staminode exerted, dorsally bearded for its entire length with fine short yellow hairs.

Dry hills and plains, Arid Transition Zone; Jefferson, Crook, and Harney Counties, Oregon, to southwestern Idaho. Type locality: Twilight Gulch, Owyhee County, Idaho. May–June.

28. *Penstemon Gairdneri* Hook. Gairdner's *Penstemon*. Fig. 4665.

Penstemon Gairdneri Hook. Fl. Bor. Amer. 2: 99. 1838.

Woody and spreading at base; stems erect, 1–3 dm. high, rather densely clothed with alternate leaves, the herbage cinereous-puberulent. Leaves linear, entire, usually recurving, 1–3 or 4 cm. long, 1–3 mm. wide, the margin revolute; thyrsus strict, glandular-pubescent; calyx-lobes narrowly to broadly lanceolate, 5–8 mm. long, acuminate to attenuate, herbaceous or the margin narrowly scarious below; corolla lavender-purple with deep blue limb, 15–20 mm. long, 4–6 mm. wide at throat, the throat scarcely ampliate, the limb 12–14 mm. across, with more or less reflexed lobes, glandular within; anther-sacs ovate-oblong, cymbiform, the line of contact short; staminode included or barely exerted, dorsally bearded for more than half its length with medium short yellow hairs. $n = 8$.

Rocky outcroppings, Arid Transition Zone; Blue Mountains of eastern Oregon. Type locality: "Blue Mountains of N.W. America, where it was gathered by Mr. Douglas, but communicated to me by Dr. Gairdner." May–July.

Penstemon Gairdneri subsp. *oreganus* (A. Gray) Keck, Amer. Midl. Nat. 23: 596. 1940. (*Penstemon Gairdneri* var. *oreganus* A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 441. 1886. *P. oregonus* Howell, Fl. N.W. Amer. 515. 1901.) Leaves appearing to be (but not truly) opposite, 2–7 cm. long, 3–5 mm. wide; corolla

pale blue or lavender to nearly white. To the east of the species in the Arid Transition Zone; Snake River watershed of eastern Oregon and adjacent Idaho. Type locality: "Mountains of E. Oregon, *Cusick*—,"

Penstemon Gairdneri subsp. *hians* (Piper) Keck, Amer. Midl. Nat. 23: 597. 1940. (*Penstemon Gairdneri* var. *hians* Piper, Bull. Torrey Club 27: 396. 1900.) Leaves alternate, short and narrow as in the species; corolla rose-purple throughout, up to 25 mm. long, the limb usually 15–20 mm. across, with widely spreading lobes. Rocky prairies of central Washington from Chelan and Douglas Counties to Klickitat County. Type locality: eastern Washington.

29. *Penstemon deustus* Dougl. Hot-rock *Penstemon*. Fig. 4666.

Penstemon deustus Dougl. ex. Lindl. Bot. Reg. 16: pl. 1318. 1830.

Penstemon deustus var. *suffrutescens* Henderson, Rhodora 33: 206. 1931.

Penstemon deustus var. *Savagei* Henderson, loc. cit.

Stems woody and much branched below, forming clumps 2–6 dm. high, erect, glabrous or glandular-puberulent. Leaves bright green, coarsely dentate-serrate, those of sterile shoots 1–5 cm. long, 6–20 mm. wide, short-petiolate, those of fertile shoots linear-lanceolate to elliptic-ovate, sessile or clasping, all acute to acuminate; thyrsus strict, sparingly glandular; calyx-lobes lanceolate to ovate-attenuate; corolla ochroleucous, prominently marked with purplish guide lines, 10–16 mm. long, nearly tubular, the upper lip shorter than the lower, sparingly glandular without and within; anther-sacs orbicular, explanate, widely divaricate, 0.7 mm. long; staminode reaching orifice, usually glabrous, sometimes short-bearded toward apex. $n = 8$.

Dry rocky ground, mainly Arid Transition Zone; Columbia Basin, eastern Washington, to western Glenn County and the central Sierra Nevada, California, east to Wyoming. Type locality: "Native of North-west America, where it was found by Mr. Douglas on scorched, rocky plains, in the interior." May–July.

Penstemon deustus subsp. *sudans* (M. E. Jones) Pennell & Keck, Amer. Midl. Nat. 23: 600. 1940. (*Penstemon sudans* M. E. Jones, Contr. West. Bot. No. 8: 37. 1898.) Herbage and corolla prominently glandular-pubescent. Arid Transition Zone; common in volcanic soils in Lassen County, California. Type locality: "between Amedee and Susanville."

Penstemon deustus subsp. *heteránder* (Torr. & Gray) Pennell & Keck, Amer. Midl. Nat. 23: 603. 1940. (*Penstemon heteránder* Torr. & Gray, Pacif. R. Rep. 2: 123. 1855.) Very woody, with reduced stems; leaves mostly narrow and finely toothed, glabrous, glaucescent; corolla obscurely viscid-puberulent without and glabrous within. Occupying the triangle from south central Oregon, to northeastern California, and north-western Nevada to the exclusion of the typical form. Type locality: apparently in eastern Shasta County, California.

30. *Penstemon variabilis* Suksd. Variable *Penstemon*. Fig. 4667.

Penstemon variabilis Suksd. Deutsch. Bot. Monatss. 18: 153. 1900.

Penstemon paniculatus Howell, Fl. N.W. Amer. 513. 1901.

Closely resembling *P. deustus* in general habit and in the form and appearance of the flower. Leaves ternate, quaternate, or opposite, or becoming somewhat scattered, narrowly linear to lance-oblong, 2–8 mm. wide, quite entire to finely serrate toward the apex; inflorescence usually branched, sometimes strict; calyx-lobes glandular-pubescent to rarely glabrous; corolla 10–12(–15) mm. long, rather strongly glandular-pubescent; staminode usually bearded apically. $n = 16$.

Open rocky slopes, Arid Transition Zone; Klickitat County, Washington, to Grant and Deschutes Counties, Oregon. Type locality: in a ravine east of the Klickitat River. June–July.

31. *Penstemon Tracyi* Keck. Tracy's *Penstemon*. Fig. 4668.

Penstemon Tracyi Keck, Amer. Midl. Nat. 23: 603. 1940.

Suffrutescent subshrub 8–12 cm. high, the light green glaucescent herbage glabrous throughout. Leaves coriaceous, cuneate-oblong or oval to orbicular, mostly entire, some finely denticulate, those of the basal rosette numerous, short-petiolate, the cauline usually tapering to a sessile base; thyrsus contracted, dense, 2–4 cm. long, of 2 or 3 clusters; calyx 2.5–3 mm. high, the lobes ovate, acute, with narrowly hyaline erosulate margin; corolla pink, 11–13 mm. long, tubular, the palate densely villous, the limb small; anther-sacs orbicular, explanate, opposite, 0.4 mm. long; staminode included, sparsely bearded toward apex.

A very distinctive species known only from the type locality, at the head of White's Creek, Devil's Canyon Mountains, Trinity County, California, where it grows in rock crevices at 7,000 feet altitude. July–Aug.

32. *Penstemon albomarginatus* M. E. Jones. White-margined *Penstemon*. Fig. 4669.

Penstemon albomarginatus M. E. Jones, Contr. West. Bot. No. 12: 61. 1908.

Stems 15–30 cm. high, several from an elongated fleshy deeply buried root, the whole plant pallid, glaucescent, glabrous. Leaves entire, spatulate to narrowly obovate, 2.5–6 cm. long, together with the calyx-lobes narrowly bordered with a white scarious more or less scabrid margin; thyrsus leafy, 5–12 cm. long; calyx-lobes linear-lanceolate to broadly ovate-oblong; corolla lavender-pink, whitish ventrally, with purple guide lines within, 13–18 mm. long, up to 5 mm. wide at throat, the two palatal ridges bearded with flattened yellow hairs, anther-sacs broadly ovate, explanate; staminode reaching orifice, glabrous.

Confined to deep sand, Lower Sonoran Zone; Mojave Desert of eastern California, southern Nevada, and northwestern Arizona. Type locality: Goodsprings, Nevada. March–May.



4664



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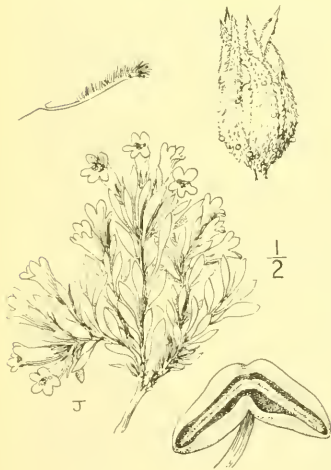
4667



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4664. *Penstemon seorsus*
 4665. *Penstemon Gairdneri*
 4666. *Penstemon deustus*

4667. *Penstemon variabilis*
 4668. *Penstemon Tracyi*
 4669. *Penstemon albomarginatus*

4670. *Penstemon Thompsoniae*
 4671. *Penstemon californicus*
 4672. *Penstemon Thurberi*

33. *Penstemon Thompsoniae* (A. Gray) Rydb. Thompson's Penstemon. Fig. 4670.

Penstemon pumilus var. *Thompsoniae* A. Gray, Syn. Fl. N. Amer. 2: 269. 1878.

Penstemon Thompsoniae Rydb. Bull. Torrey Club 36: 690. 1909.

Stems prostrate or ascending, arising from a woody caudex surmounting a fibrous-rooted underground stem, scarcely creeping, forming tufts or mats 2-5 cm. high and 10-25 cm. across. Leaves entire, oblanceolate to spatulate-oblong, mucronate, cinereous-whitened with closely appressed hairs, 1-2 cm. long; thyrsus racemiform, leafy, obscurely viscid; calyx-lobes acuminate to attenuate, with or without a narrow scarious margin toward base; corolla blue-violet, 13-18 mm. long, up to 5 mm. wide at throat, nearly tubular, the palate bearded; anther-sacs ovate-oblong; staminode golden bearded for most of its length.

Gravelly slopes, Upper Sonoran Zone; Mojave Desert of eastern California (Clark Mountain), east to southeastern Nevada, southern Utah, and northern Arizona. Type locality: "S. Utah, Mrs. Thompson." May-June.

34. *Penstemon californicus* (Munz & Jtn.) Keck. California Penstemon. Fig. 4671.

Penstemon linarioides var. *californicus* Munz & Jtn. Bull. S. Calif. Acad. 23: 31. 1924.

Penstemon californicus Keck, Bull. Torrey Club. 64: 378. 1937.

Stems 5-15 cm. high, tufted, densely leafy below, the herbage cinereous-puberulent throughout with appressed flattened hairs. Leaves linear-oblanceolate, the largest 8-15 mm. long, mucronate, thickish; thyrsus racemiform, minutely glandular; calyx-lobes ovate, acute to acuminate, the margin scarious; corolla narrowly tubular-funnelform, purplish blue, 14-18 mm. long, 4.5-6 mm. wide pressed; anther-sacs ovate-oblong; staminode yellow-bearded most of its length or chiefly apically.

Upper Sonoran Zone; San Jacinto Mountains, California, to Sierra San Pedro Martir, Lower California. Type locality: Kenworthy, Hemet Valley, San Jacinto Mountains. May-July.

35. *Penstemon Thúrberi* Torr. Thurber's Penstemon. Fig. 4672.

Penstemon Thurberi Torr. Pacif. R. Rep. 7³: 15. 1856.

Penstemon ambiguus var. *Thurberi* A. Gray, Proc. Amer. Acad. 6: 65. 1862.

Leiotemon Thurberi Greene, Leaflets Bot. Obs. 1: 223. 1906.

A rather intricately branched bush 3-6 dm. high, woody below, the numerous slender erect stems unbranched or with few to several ascending branches, glabrous throughout. Leaves bright green, equally distributed, entire, more or less scabrid on the margin, mostly narrowly linear and involute, 1-3 cm. long, 1 mm. wide, but some older leaves often as much as 3 mm. wide; thyrsus racemose, the short divaricate peduncles mostly 1-flowered; calyx 2-3 mm. high, the broadly ovate lobes abruptly acuminate, entire; corolla lavender-rose, 12-15 mm. long, obliquely salverform, the limb large; anther-sacs oval, explanate, 0.75 mm. long; staminode included, glabrous.

Sandy ground, Upper Sonoran Zone; southern California in the Providence Mountains, the Little San Bernardino Mountains, and San Felipe, to northern Lower California, Arizona, and New Mexico. Type locality: Burro Mountains, New Mexico. May-June, sometimes blooming again Sept.-Oct.

36. *Penstemon monoënsis* Heller. Mono Penstemon. Fig. 4673.

Penstemon monoënsis Heller, Muhlenbergia 2: 246. 1906.

Penstemon divergens M. E. Jones, Contr. West. Bot. No. 12: 246. 1908.

Stems 15-35 cm. high, densely cinereous-puberulent. Leaves entire, the margin often crisped, densely scurfy puberulent, large, the basal with lance-oblong to broadly oval blades, the cauline narrowly elliptic below to deltoid-ovate and broadly clasping above; thyrsus densely glandular-pubescent, of 4-8 dense clusters; calyx 7-8 mm. high, up to 12 mm. high in fruit, the lobes linear-lanceolate; corolla rose-purple or wine-red, 14-20 mm. long, 4-6 mm. wide pressed, tubular-funnelform, glabrous within or sometimes the palate sparingly pilose; anther-sacs divergent, dehiscent quite to proximal apices, not explanate, 1.5 mm. long; staminode included, strongly bearded for its outer half with fine short yellow hairs.

Dry hills and sandy washes, Upper Sonoran Zone; desert ranges bordering Owens Valley, Mono and Inyo Counties, California. Type locality: base of the White Mountains near Southern Belle Mine. May-June.

37. *Penstemon calcáreus* Brandg. Lime Penstemon. Fig. 4674.

Penstemon calcareus Brandg. Zoe 5: 152. 1903. Not M. E. Jones, 1908.

Penstemon desertorum M. E. Jones, Contr. West. Bot. No. 12: 59. 1908.

Stems 5-25 cm. high, densely pruinose-puberulent, anthocyanous. Leaves entire, or some of them obscurely denticulate, puberulent, the basal with elliptic to broadly ovate blades 1.5-4 cm. long, the cauline linear- to oblong-lanceolate, the uppermost often subcordate-amplexicaul; thyrsus densely glandular-pubescent, of 2-6 congested clusters; calyx 6 mm. high (in flower), up to 11 mm. high in fruit, the lobes linear-lanceolate; corolla light rose-red to rose-purple, 12-14(-17) mm. long, 2.5-4 mm. wide pressed, narrowly tubular, palate sparingly pilose; anther-sacs widely divaricate, rotund, peltately explanate, 0.5-0.6 mm. long; staminode included, strongly bearded for two-thirds its length with rather coarse golden-yellow hairs.

Dry canyonsides, Lower Sonoran Zone; Grapevine Mountains, north end of Death Valley, and Providence Mountains, Mojave Desert, California. Type locality: "the face of perpendicular limestone cliffs of Providence Mt." May.

38. *Penstemon miser* A. Gray. Golden-tongued Penstemon. Fig. 4675.

Penstemon miser A. Gray, Syn. Fl. N. Amer. ed. 2: 441. 1886.

Stems 10–25 cm. high, cinereous-puberulent. Leaves mostly entire, some remotely serrulate or sinuately toothed, densely cinereous-puberulent throughout, the basal with linear-lanceolate to elliptic blades, the upper cauline linear to oblong; thyrsus densely glandular-pubescent, compact; calyx 8–12 mm. high, the lobes lanceolate, acuminate; corolla dull purple, with purple guide lines, markedly variable in size, 13–28 mm. long, 4.5–10 mm. wide, the rather long tube abruptly flaring into an ample throat, strongly 2-lipped, the palate strongly pilose; anther-sacs widely divaricate, broadly ovate, peltately explanate, very small; staminode prominently exserted, hooked, strongly bearded throughout with stiffish deep orange velvety hairs.

Sandy or gravelly slopes of the Great Basin region, Arid Transition Zone; southeastern Oregon and adjacent Idaho to Lassen County, California, and central Nevada. Type locality: Malheur River, Oregon. May–July.

39. *Penstemon eriantherus* Pursh. Crested-tongued Penstemon. Fig. 4676.

Penstemon eriantherus Pursh, Fl. Amer. Sept. 2: 737. 1814.

Penstemon cristatus Nutt. Gen. 2: 52. 1818.

Stems 1–3 dm. high, villous to canescent. Leaves entire to saliently and remotely toothed, glandular-pubescent to canescent, the basal with lanceolate to ovate blades, the upper cauline lanceolate to oblong; thyrsus densely glandular-pubescent, compact; calyx 7–12 mm. high, the lobes linear-lanceolate, accrescent; corolla lilac-purple, with deeper purple guide lines, 20–35 mm. long, 9–14 mm. wide, the throat strongly ampliate, the limb ample, the palate prominently pilose; anther-sacs widely divaricate, explanate, as long as or somewhat longer than wide; staminode prominently exserted, strongly bearded throughout with long yellow hairs; capsule and ovary glandular-puberulent. $n = 8$.

Dry soil, Arid Transition Zone; Spokane County, Washington, north to British Columbia and Alberta, east to the Dakotas, Nebraska, and Wyoming. Type locality: "In upper Louisiana" (now in South Dakota). May–July.

40. *Penstemon Whitédii* Piper. Whited's Penstemon. Fig. 4677.

Penstemon Whitédii Piper, Bot. Gaz. 22: 490. 1896.

Penstemon eriantherus var. *Whitédii* A. Nels. Bot. Gaz. 54: 148. 1912.

Stems 1–4 dm. high, pubescent to glabrate. Leaves entire to sharply toothed, glabrous to densely cinereous-puberulent, broadly linear to lanceolate or oblanceolate, the upper cauline cordate-clasping, 3–4 times longer than broad; thyrsus rather densely glandular-pubescent, of 3–6 dense remote clusters 4.5–6 cm. broad, foliose below; calyx 7–12 mm. high, the lobes lanceolate, acute to attenuate; corolla red-purple tinged with blue, with darker guide lines, 18–23 mm. long, 6–9 mm. wide pressed, the ample throat culminating in a rather small limb, the palate somewhat pilose; anther-sacs widely divaricate, much longer than broad, not explanate, with short line of contact; staminode scarcely exserted, densely bearded for most of its length with hairs much longer than its width. $n = 8$.

Rocky soil, Arid Transition Zone; southern Chelan County, Washington. Type locality: Wenatchee. May–July.

Penstemon Whitédii subsp. *tristis* Pennell & Keck, Bull. Torrey Club 65: 254. 1938. Upper cauline leaves merely sessile or even narrowed at base, mostly 5–8 times longer than broad; flower-clusters 2–4 cm. broad. Gravelly slopes, Arid Transition Zone; eastern Wallowa County, Oregon, to central Idaho. Type locality: Antelope Creek, Custer County, Idaho. May–July.

Penstemon Whitédii subsp. *dayanus* (Howell) Keck, Bull. Torrey Club 65: 254. 1938. (*Penstemon dayanus* Howell, Fl. N.W. Amer. 511. 1901; *P. eriantherus* var. *argillosus* M. E. Jones, Contr. West. Bot. No. 12: 62. 1908.) Staminode sparsely bearded with hairs about equaling its width to glabrate or rarely glabrous. Open dry hillsides, Arid Transition Zone; valleys of the John Day and Deschutes Rivers, north-central Oregon. Type locality: "Hillsides and plains, Muddy Station, John Day Valley, Oregon." May–June.

41. *Penstemon payettensis* Nels. & Macbr. Payette Penstemon. Fig. 4678.

Penstemon payettensis Nels. & Macbr. Bot. Gaz. 62: 147. 1916.

Stems few to several from a compact crown, forming clumps 1.5–6 dm. high, the bright green herbage glabrous throughout. Leaves entire, thickish, the basal oblanceolate to narrowly obovate, on long slender petioles, up to 18 cm. long and up to 3 cm. wide, the cauline lance-oblong, the uppermost becoming ovate and sessile by a rounded or subcordate base and sharply acute; thyrsus of 3–7 scarcely interrupted many-flowered clusters, often somewhat secund, leafy only at base; calyx 4.5–8 mm. high, the lobes broadly lanceolate or ovate, abruptly narrowed to a short attenuate tip; corolla bright purplish blue, 22–27 mm. long, glabrous, the tube, which exceeds the calyx, rather abruptly flaring into the dilated throat, the ample limb distinctly 2-lipped; anther-sacs opposite, straight or crescentic, 1.3–1.5 mm. long, opening from the apex to the line of contact, the suture minutely denticulate-ciliate; staminode glabrous. $n = 8$.

Sandy or rocky soil, Canadian Zone; Wallowa Mountains, Oregon, to central Idaho. Type locality: Payette National Forest, Idaho. May–Aug.

42. *Penstemon speciosus* Dougl. Showy Penstemon. Fig. 4679.

Penstemon speciosus Dougl. ex Lindl. Bot. Reg. 15: pl. 1270. 1829.

Penstemon glaber var. *occidentalis* A. Gray, Proc. Amer. Acad. 6: 60. 1862.

Penstemon glaber speciosus Rydb. Mem. N.Y. Bot. Gard. 1: 344. 1900.

Penstemon pilifer Heller, Muhlenbergia 2: 136. 1906.

Penstemon rex Nels. & Macbr. Bot. Gaz. 55: 381. 1913.

Penstemon deserticola Piper, Proc. Biol. Soc. Wash. 32: 43. 1919.

Penstemon speciosus var. *pilifer* Munz & Jtn. Bull. S. Calif. Acad. 23: 35. 1924.

Penstemon fruticiformis var. *spiciformis* Jepson, Man. Fl. Pl. Calif. 912. 1925.

Herbage glabrous to pruinose-puberulent, sometimes glaucescent; stems in erect clumps



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4673. *Penstemon monoensis*
 4674. *Penstemon calcareus*
 4675. *Penstemon miser*

4676. *Penstemon eriantherus*
 4677. *Penstemon Whitedii*
 4678. *Penstemon payettensis*

4679. *Penstemon speciosus*
 4680. *Penstemon Pennellianus*
 4681. *Penstemon acuminatus*

2-8 dm. high. Leaves entire, thickish, the basal lanceolate to oblanceolate or spatulate, up to 15 cm. long, the cauline linear-lanceolate, merely sessile; thyrsus elongated, of numerous obscurely interrupted showy clusters, more or less secund; calyx 4-6 or 8 mm. high, the lobes narrowly ovate to broadly oblong or suborbicular with short tip; corolla bright blue-purple, 25-35 mm. long, 8-10 mm. wide pressed, glabrous, the rather long tube abruptly flaring into the ample throat, the large limb strongly 2-lipped; anther-sacs divaricate, sigmoid-curved, 2-2.4 mm. long, opening from the apex for two-thirds the distance to the line of contact, the suture finely toothed; staminode glabrous, or rarely bearded apically. $n = 8$.

Dry plains and hillsides, mostly confined to the Arid Transition Zone; central Washington to southern California, mostly east of the Cascade-Sierran axis, east to Idaho and Utah. Type locality: Spokane River, May-July.

Penstemon speciosus subsp. *Kennedyi* (A. Nels.) Keck, Amer. Midl. Nat. 23: 613. 1940. (*Penstemon Kennedyi* A. Nels. Proc. Biol. Soc. Wash. 17: 97. 1904.) Stems ascending-erect, 0.5-4 dm. high; calyx 8-12 mm. high, the lobes lance-attenuate or ovate with acuminate tip. Canadian and Hudsonian Zones; Warner Mountains, east flank of the Sierra Nevada from Sierra Nevada to Inyo County, White Mountains, and adjacent Nevada. Type locality: Truckee Pass, Virginia Mountains, Washoe County, Nevada. June-July.

43. *Penstemon Pennellianus* Keck. Blue Mountain Penstemon. Fig. 4680.

Penstemon Pennellianus Keck, Amer. Midl. Nat. 23: 614. 1940.

Herbage green and glabrous throughout; stems in erect clumps 2-5 dm. high. Leaves entire, firm, the basal lanceolate or narrowly elliptic, 8-25 cm. long, 1-3.5 cm. wide, long-petiolate, the cauline oblong-lanceolate to ovate, acute, the uppermost cordate-amplexicaul; thyrsus of 3-10 many-flowered continuous clusters; calyx 5-10 mm. high, the lobes lance-ovate, acuminate or caudate at tip, the margin hyaline, subentire; corolla bright blue tinged with purple, 26-32 mm. long, 9-10 mm. wide pressed, glabrous, the tube abruptly flaring into the ample throat, the ample limb not strongly 2-lipped; anther-sacs divaricate, sigmoid-curved, 2-2.4 mm. long, opening partially like *speciosus*, sparsely hirtellous toward base and the suture finely toothed; staminode short-hirsute apically.

Gravelly ridges and slopes, Arid Transition and Canadian Zones; Blue Mountains of southeastern Washington and adjacent Oregon. Type locality: Joseph Creek Canyon below Flora, Wallawa County, Oregon. June-July.

44. *Penstemon acuminatus* Dougl. Sand-dune Penstemon. Fig. 4681.

Penstemon acuminatus Dougl. ex Lindl. Bot. Reg. 15: pl. 1285. 1829.

Glabrous and glaucous throughout or occasionally minutely viscidulous; stems erect or nearly so, rather stout, 2-4 dm. high. Leaves entire, coriaceous, the basal lanceolate to broadly elliptic or spatulate, with often stout petioles, the cauline elliptic to ovate, the upper cordate-amplexicaul and often nearly rotund except for the short abrupt acuminate tip, strongly veined; thyrsus often much elongated, very leafy below, the 3-18 clusters compact and often congested; calyx 5-8 mm. high, accrescent, the lobes lanceolate, acuminate to attenuate, very narrowly scarious-margined, entire; corolla pale blue-purple, 12-18 mm. long, 4-5 mm. wide pressed, the throat gradually ampliate, the limb obscurely 2-lipped; anther-sacs opposite, 1.2 mm. long, dehiscent throughout but not explanate; staminode apically dilated and bearded with flattened golden hairs. $n = 8$.

Old dunes and sandy sagebrush flats, Upper Sonoran Zone; in Washington from Grant County to Walla Walla and Klickitat Counties, and in adjacent Oregon along the Columbia River; also in Malheur and Harney Counties, Oregon, east to Idaho. Type locality: "barren sandy plains of the Columbia." May-June.

45. *Penstemon Palmeri* A. Gray. Scented Penstemon. Fig. 4682.

Penstemon Palmeri A. Gray, Proc. Amer. Acad. 7: 379. 1868.

Gray-glaucous and glabrous below the inflorescence, the stems 5-14 dm. high. Leaves irregularly spinulose-dentate or the uppermost subentire, the basal oblong-ovate, the cauline lance-ovate, obtuse or acute, auriculate-clasping, the upper pairs usually connate-perfoliate, the largest to 15 cm. long and to 9 cm. wide; thyrsus glandular-pubescent, virgate, secund, the peduncles suberect, 2-3-flowered; calyx 4-6 mm. high, the lobes broadly ovate; corolla whitish suffused with pink or lilac, with prominent guide lines extending into throat from lower lip, 22-35 mm. long, 10-20 mm. wide pressed, the short tube abruptly expanding into the strongly inflated throat, the lobes reflexed, villous across base of lower lip; anther-sacs longer than broad, peltately explanate; staminode exerted, bearded with shaggy yellow hairs 3 mm. long, like the shorter pair of fertile filaments glandular-pubescent at base; ovary usually glandular-puberulent. $n = 8$.

Desert washes and sagebrush-covered slopes, Lower Sonoran Zone; ranges west of Death Valley and in the Providence and New York Mountains, California, north to Nevada, east to Utah and Arizona. Type locality: Skull Valley, Arizona. Unique in having fragrant flowers, with the odor of clover blossoms. May-June.

46. *Penstemon Grinnellii* Eastw. Grinnell's Penstemon. Fig. 4683.

Penstemon Grinnellii Eastw. Bull. Torrey Club 32: 207. 1905.

Penstemon scrophularioides M. E. Jones, Contr. West. Bot. No. 12: 65. 1908.

Penstemon Palmeri var. *Grinnellii* Munz & Jtn. Bull. Torrey Club 49: 42. 1922.

Penstemon hians I. M. Johnston, Contr. Gray Herb. No. 68: 92. 1923.

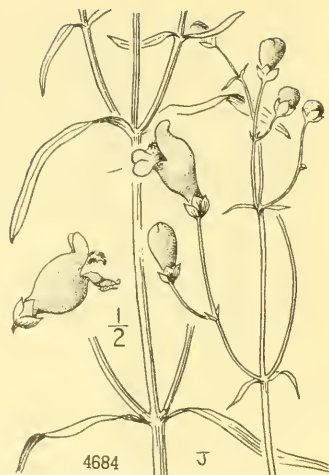
Stems branching below, forming a rounded bush 3-10 dm. high. Leaves green or glaucous, finely to coarsely spinulose-dentate or the uppermost entire, like those of *Palmeri* but not connate; thyrsus more lax and open, 4-8 cm. wide; corolla nearly white or pale purplish or bluish



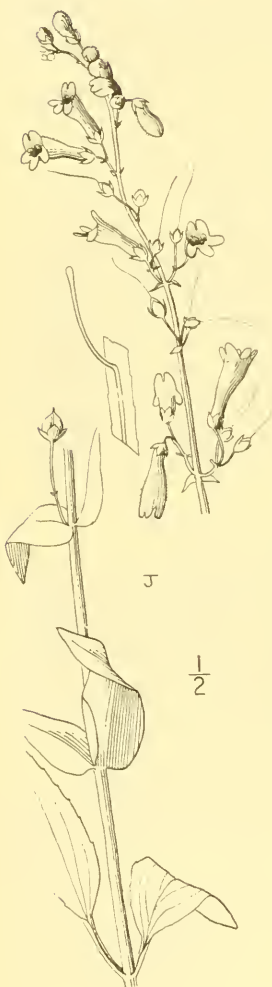
4682



4683



4684



4687



4685



4688



4686

4682. *Penstemon Palmeri*
 4683. *Penstemon Grinnellii*
 4684. *Penstemon fruticiformis*

4685. *Penstemon floridus*
 4686. *Penstemon pseudospectabilis*

4687. *Penstemon Clevelandii*
 4688. *Penstemon Stephensii*

with color paler without than within, the guide lines prominent, 20–30 mm. long, 10–15 mm. wide pressed, similar to that of *Palmeri*; ovary usually glabrous. $n = 8$.

Dry slopes, Transition Zone; California, occasional in the South Coast Ranges from the Mount Hamilton Range to the Santa Lucia Mountains, and in the southern Sierra Nevada, common from the Greenhorn Range and Mount Pinos to the San Jacinto and Santa Rosa Mountains. Type locality: "Mt. Wilson." April–July.

47. *Penstemon fruticiformis* Coville. Death Valley Penstemon. Fig. 4684.

Penstemon fruticiformis Coville, Contr. U.S. Nat. Herb. 4: 170. 1893.

Stems much-branched from the shrubby base, 3–6 dm. high, the herbage glaucous and glabrous throughout. Leaves essentially entire, narrowly linear-lanceolate, to 6 mm. wide, the margin more or less involute; thyrsus lax and short like that of *Grinnellii*; calyx 5–7 mm. high, the lobes ovate to nearly rotund, abruptly acute to short-acuminate; corolla white or flesh-colored, with pale lavender limb, the purple guide lines evident, 20–27 mm. long, 10–13 mm. wide, externally glabrous, otherwise similar to that of *Palmeri*. $n = 8$.

Gravelly or rocky slopes and canyon bottoms, Lower Sonoran Zone; Panamint, Argus, and Inyo Ranges, west of Death Valley, Inyo County, California. Type locality: "Wild Rose Canyon, Panamint Mountains." May–June.

Penstemon fruticiformis subsp. *amargosae* Keck, Amer. Midl. Nat. 18: 801. 1937. Calyx-lobes lance-ovate to broadly ovate; corolla externally glandular-puberulent, but internally less glandular than in the typical form. Kingstons Mountains, eastern San Bernardino County, California, north to the Amargosa Desert, Nevada, east of Death Valley. Type locality: Amargosa Desert, Nye County, Nevada. May–June.

48. *Penstemon floridus* Brandg. Rose Penstemon. Fig. 4685.

Penstemon floridus Brandg. Bot. Gaz. 27: 454. 1899.

Stems several from the base, erect, virgate, 6–12 dm. high, the herbage blue-glaucous and glabrous below the inflorescence. Leaves irregularly spinulose-dentate or the uppermost subentire, the basal oblong-ovate, the cauline lance-ovate, mostly obtuse, sessile or auriculate-clasping but distinct, the largest to 10 cm. long and to 4 cm. or more wide; thyrsus glandular-pubescent; calyx-lobes narrowly to broadly ovate; corolla rose-pink, often yellowish in bud and at tube, with dark guide lines within, 22–30 mm. long, 12–15 mm. wide pressed, abruptly inflated, strongly gibbous, slipper-shaped, the orifice oblique, the base of the lower lip projecting beyond that of the upper lip, the lobes reflexed, not villous within; staminode glabrous. $n = 8$.

Arid canyons and hillsides, Upper Sonoran Zone; White and Inyo Mountains, California, and adjacent Nevada. Type locality: Mount Magruder, Nevada. May–July.

Penstemon floridus subsp. *Austinii* (Eastw.) Keck, Amer. Midl. Nat. 18: 803. 1937. (*Penstemon Austinii* Eastw. Bull. Torrey Club 32: 206. 1905.) Corolla gradually ampliate, not strongly gibbous, the orifice not oblique, the throat 6–10 mm. wide pressed. Occurring in similar habitats but south of the typical form in the Inyo and Panamint Mountains of Inyo County, California, and in adjacent Nevada. Type locality: Oak Creek, Inyo County. May–June.

49. *Penstemon pseudospectabilis* M. E. Jones. Desert Penstemon. Fig. 4686.

Penstemon pseudospectabilis M. E. Jones, Contr. West. Bot. No. 12: 66. 1908.

Habit of *P. floridus*, the stems 6–10 dm. high. Leaves glaucous, thinnish, serrate with prominent often caudate teeth, the basal lance-ovate to broadly ovate, the upper cauline connate-perfoliate, forming disks up to 12 cm. long and 6 cm. broad; thyrsus sparingly glandular; calyx-lobes mostly ovate and short-acuminate; corolla rose-purple, often yellowish in bud and at tube, with dark guide lines within, 20–26 mm. long, 6–9 mm. wide pressed, moderately ampliate, viscid-puberulent but not villous at orifice; staminode glabrous. $n = 8$.

Desert washes and canyons, Lower Sonoran Zone; southeastern Mojave and Colorado Deserts of California, east to Arizona. Type locality: Chemehuevis Mountains, northwestern Arizona. March–May.

50. *Penstemon Clevelandii* A. Gray. Cleveland's Penstemon. Fig. 4687.

Penstemon Clevelandii A. Gray, Proc. Amer. Acad. 11: 94. 1876.

Stems few to several, 3–7 dm. high. Leaves glaucescent to deep green, entire to moderately serrate, the basal ovate, the upper cauline deltoid-lanceolate to cordate, distinct; pedicels and calyces glandular-pubescent or occasionally glabrous; thyrsus narrowly racemose, 1–3 dm. long, 3–6 cm. broad; calyx-lobes ovate to suborbicular, obtuse to acuminate, purplish; corolla crimson or red-purple, without prominent guide lines, 17–24 mm. long, 5–8 mm. wide pressed, tubular-funneliform, the tube proper shorter than the gradually ampliate throat, not contracted at orifice, the quadrate lobes rotately spreading, the limb glandular-puberulent but not pilose within; anthers sacs explanate, glabrous; staminode 8.5–11 mm. long, feebly bearded or glabrous. $n = 8$.

Arid canyon sides bordering the desert, Lower Sonoran Zone; San Diego County, California, to Lower California. Type locality: Canyon Tantilas, Lower California. March–May.

Penstemon Clevelandii subsp. *connatus* (Munz & Jtn.) Keck, Amer. Midl. Nat. 18: 811. 1937. (*Penstemon Clevelandii* var. *connatus* Munz & Jtn. Bull. Torrey Club 49: 357. 1923.) Leaves blue-glaucous, strongly and finely serrate, the upper connate-perfoliate; pedicels and calyces glabrous; corolla broad for the species, the limb not glandular within, glabrous or obsoletely pilose; anthers not explanate, ciliolate-denticulate; staminode 9–10 mm. long, bearded. Canyons bordering the western side of the Colorado Desert, Riverside County, California. Type locality: near Van Deventer's, southeastern base of San Jacinto Mountains.

Penstemon Clevelandii subsp. *mohavensis* Keck, Amer. Midl. Nat. 18: 810. 1937. (*Penstemon Clevelandii* var. *mohavensis* McMinn, Ill. Man. Calif. Shrubs 511. 1939.) Leaves bright green, strongly and coarsely serrate; corolla contracted at orifice, narrow for the species, the limb not glandular within but densely pilose at base of lower lip; staminode 6–8 mm. long, bearded. Occasional from the Little San Bernardino Mountains to the Sheephole Mountains, along the southern edge of the Mojave Desert, California. Type locality: Keyes Ranch, Little San Bernardino Mountains.

51. *Penstemon Stephensii* Brandg. Stephens' Penstemon. Fig. 4688.*Penstemon Stephensii* Brandg. Zoe 5: 151. 1903.*Penstemon Clevelandii* var. *Stephensii* Munz & Jtn. Bull. Torrey Club 49: 41. 1922.

Stems few to several, 3–10 dm. high. Leaves thinnish, mostly finely and sharply denticulate, the several upper cauline pairs connate-perfoliate, forming disks up to 10 cm. long and 4 cm. broad; thyrsus strict, subsecund, sparingly glandular, 1–3.5 dm. long, 3–4 cm. broad; calyx 3–4.5 mm. high, the lobes broadly ovate to subrotund, abruptly acute; corolla rose to pink-lavender, without prominent guide lines, 17–22 mm. long, 4–6 mm. wide pressed, essentially tubular or the throat slightly dilated, the tube about equaling the throat, the quadrate lobes rotately spreading, the limb glandular-puberulent but not pilose within; anther-sacs peltately explanate, glabrous, as broad as or broader than long; staminode included, glabrous.

Rocky slopes, Lower Sonoran Zone; Kingston and Providence Mountains, eastern Mojave Desert, California. Type locality: Providence Mountains. May–June.

52. *Penstemon incertus* Brandg. Mojave Penstemon. Fig. 4689.*Penstemon incertus* Brandg. Bot. Gaz. 27: 454. 1899.*Penstemon fruticiformis* var. *incertus* Munz & Jtn. Bull. S. Calif. Acad. 23: 33. 1924.

In habit similar to *P. fruticiformis*, usually shrubby, forming broad clumps in age, 6–8 dm. high, the numerous stems branching below, the herbage glabrous and glaucous. Leaves narrowly linear-lanceolate; thyrsus lax, moderately glandular; calyx 5–7 mm. high, the lobes lance-ovate to nearly rotund; corolla violet with a reddish cast or purple, the limb deep blue, without guide lines, 25–28 mm. long, 8–11 mm. wide pressed, the rather long tube gradually expanding into the ample throat, strongly 2-lipped, the lips reflexed, the lower one villous at base; anther-sacs divaricate, not explanate, minutely denticulate-ciliolate at suture; staminode well included, short, straight, densely bearded almost throughout.

Dry sandy or rocky benches, Sonoran Zones; western borders of the Mojave Desert, California, from eastern base of the Sierra Nevada and Argus Mountains, Inyo County, to Antelope Valley and base of the San Bernardino Mountains. Type locality: Walker Pass. May–June.

53. *Penstemon spectabilis* Thurb. Notable Penstemon. Fig. 4690.*Penstemon spectabilis* Thurb. ex A. Gray, Pacif. R. Rep. 4: 119. 1856.

Stems several from the base, erect, 8–12 dm. high, the herbage green or glaucescent and glabrous throughout. Leaves coarsely serrate, the lower broadly oblanceolate to ovate, 4–10 cm. long, 2–5 cm. broad, the upper connate-perfoliate; thyrsus lax, often half as tall as the plant; calyx 4–7 mm. high, the lobes lance-ovate to orbicular; corolla lavender-purple with blue lobes, whitish within, 25–33 mm. long, 8–12 mm. wide pressed, the tube rather abruptly expanding into the ample throat, the limb strongly bilabiate, the upper lip nearly erect, the lower lip reflexed, sometimes feebly bearded at base; anther-sacs not explanate, twice as long as wide, scabro-ciliolate at suture; staminode glabrous at tip. $n = 8$.

Dry washes and hillsides, Upper Sonoran Zone; eastern Los Angeles County, California, to northern Lower California. Type locality: San Pasqual, San Diego County. April–June.

Penstemon spectabilis subsp. *subviscosus* Keck, Amer. Midl. Nat. 18: 818. 1937. (*Penstemon spectabilis* var. *subviscosus* McMinn, Ill. Man. Calif. Shrubs 513. 1939.) Pedicels and calyces glandular-pubescent. The common form in California from the Liebre and Santa Monica Mountains to the outwash fans of the San Gabriel and San Bernardino Mountains. Type locality: Claremont, Los Angeles County.

× *Penstemon Parishii* (*P. centranthifolius* × *spectabilis*) (A. Gray) Keck, Amer. Midl. Nat. 18: 818. 1937. (*Penstemon Parishii* A. Gray, Proc. Amer. Acad. 17: 228. 1882; *P. spectabilis* var. *Gilmanii* Jepson, Man. Fl. Pl. Calif. 912. 1925.) Habit of *P. centranthifolius*; herbage glaucescent and glabrous throughout; leaves entire to shallowly serrate, the uppermost clasping but distinct; thyrsus virgate; corolla red-purple, the gradually ampliate throat 6–9 mm. wide. This hybrid is not uncommon in the region where the two parents occur together, from Los Angeles County to San Diego County, California. Type locality: "S.E. California, in the Cucamonga Mountains."

54. *Penstemon centranthifolius* Benth. Scarlet Bugler. Fig. 4691.*Penstemon centranthifolius* Benth. Scroph. Indicae 7. 1835.

Glabrous and glaucous throughout; stems several, virgate, 3–12 dm. high. Leaves entire, the basal spatulate, petiolate, the cauline linear-lanceolate to ovate-lanceolate, the upper pairs often auriculate-clasping, 4–10 cm. long, 1–3 cm. wide; thyrsus virgate, half as tall as the plant, the peduncles erect; calyx 3–6 mm. high, the lobes ovate to orbicular, abruptly acute, the margin broadly scarious, entire to erose; corolla scarlet, 25–33 mm. long, 4.5–6 mm. wide, tubular, the lobes scarcely spreading, glabrous without and within; anther-sacs peltately explanate; staminode glabrous. $n = 8$.

Dry slopes and outwash fans, Upper Sonoran Zone; Coast Ranges of California from Lake County to San Diego County, south to the Sierra San Pedro Martir, Lower California. Type locality: "Nova California." April–July.

55. *Penstemon utahensis* Eastw. Utah Bugler. Fig. 4692.*Penstemon utahensis* Eastw. Zoe 4: 124. 1893.*Penstemon Eastwoodiae* Heller, Muhlenbergia 1: 4. 1900.

Stems several, glabrous, virgate, 3–6 dm. high. Leaves coriaceous, glaucous, glabrous, or the basal scabridulous or scabrid-ciliolate, the basal lanceolate, tapering to the petiole, the cauline lance-oblong, broadest at the clasping base, 3–8 cm. long, 5–15 mm. wide; thyrsus racemiform, glabrous; calyx 3–5 mm. high, the lobes ovate to orbicular, abruptly acute, the broadly scarious



4689. *Penstemon incertus*
 4690. *Penstemon spectabilis*
 4691. *Penstemon centranthifolius*

4692. *Penstemon utahensis*
 4693. *Penstemon confusus*

4694. *Penstemon Eatonii*
 4695. *Penstemon labrosus*

margin entire to erose; corolla carmine, 18–24 mm. long, 4–6 mm. wide pressed, nearly tubular, the lobes rotately spreading or reflexed, glandular-pubescent without and densely glandular about orifice; anthers peltately explanate, glabrous; staminode uncinatate at apex, glabrous or with vestiges of a papillose beard at apex.

Occasional in canyons and on mesas, Lower Sonoran Zone; ranges of the eastern Mojave Desert, California, to southern Nevada and Utah and northern Arizona. Type locality: between Hatch's Wash and Monticello, Utah. April–May.

56. *Penstemon confusus* subsp. *patens* (M. E. Jones) Keck. Owens Valley
Penstemon. Fig. 4693.

Penstemon confusus var. *patens* M. E. Jones, Contr. West. Bot. No. 12: 63. 1908.

Penstemon confusus subsp. *patens* Keck, Amer. Midl. Nat. 18: 827. 1937.

Closely resembling *P. utahensis* in general habit, but the stems often lower and more leafy, and in this subspecies the thyrsus more open and often decompound; corolla rose-lavender or purplish, 14–20 mm. long, 5–6.5 mm. wide, slightly ampliate, glabrous without and within; anther-sacs not explanate, scabrid-ciliolate at suture; staminode uncinatate, rather densely papillose-bearded at apex. $n = 8$.

Arid sandy slopes, Upper Sonoran Zone; hills surrounding Owens Valley, Mono and Inyo Counties, California. Type locality: Lone Pine. May–June.

57. *Penstemon Eatonii* A. Gray. Eaton's Firecracker. Fig. 4694.

Penstemon Eatonii A. Gray, Proc. Amer. Acad. 8: 395. 1872.

Stems few to several, glabrous, virgate, 3–10 dm. high. Leaves coriaceous, green or glaucescent, glabrous, the basal oblanceolate, tapering to a long petiolate base, the whole up to 18 cm. long but usually shorter, the cauline lance-oblong with a clasping base, 4–10 cm. long, 1–3 cm. wide; thyrsus strict, secund, half the height of the plant, glabrous; calyx 4–6 mm. high, the lobes elliptic to broadly ovate, acute to abruptly short-acuminate, the narrow scarious margin entire; corolla scarlet, 25–30 mm. long, 6–8 mm. wide pressed, nearly tubular, obscurely 2-lipped, glabrous; anther-sacs parallel or divergent, opening by slits from their free tips for one-half to two-thirds their length, minutely puberulent, the suture finely toothed; staminode glabrous or more or less bearded. $n = 8$.

Occasional in canyons, Upper Sonoran Zone; ranges of the eastern and southern Mojave Desert, California, north and east to Nevada and Utah. Type locality: Provo Canyon, Wasatch Mountains, Utah. March–July.

Penstemon Eatonii subsp. *undösus* (M. E. Jones) Keck, Journ. Wash. Acad. 29: 491. 1939. (*Penstemon Eatonii* var. *undösus* M. E. Jones, Proc. Calif. Acad. 11: 5: 715. 1895; *P. Munzii* I. M. Johnston, Bull. Torrey Club 49: 40. 1922.) Marked by having puberulent stems and leaves and the anthers often slightly exerted. With the species in California, where it is the more abundant form, east to Arizona and southern Utah. Type locality: St. George, Utah.

58. *Penstemon labrosus* (A. Gray) Hook. f. San Gabriel *Penstemon*. Fig. 4695.

Penstemon barbatus var. *labrosus* A. Gray, Bot. Calif. 1: 622. 1876.

Penstemon labrosus Hook. f. Bot. Mag. 110: pl. 6738. 1884.

Herbage glabrous throughout, green or somewhat glaucescent; stems single or few, erect, virgate, 3–7 dm. high. Leaves coriaceous, the basal linear-oblancoolate, obtuse, short-petiolate, 5–10 cm. long, 5–7 mm. wide, the cauline linear, rapidly becoming smaller up the stem; thyrsus strict, hardly secund; calyx 4–5.5 mm. high, the lobes ovate, acuminate (or acute), the scarious margin erose to entire; corolla scarlet, 32–40 mm. long, 5–6 mm. wide pressed, tubular, the limb about three-eighths the length of the corolla, the upper lip erect, its lobes only one-fourth its length, the lower lip divided to base with strongly reflexed linear divisions, glabrous; anther-sacs opposite, opening by slits from their free tips for two-thirds their length, glabrous, the suture minutely denticulate; staminode glabrous. $n = 8$.

Wooded slopes and grassy opens, Transition Zone; mountains of southern California, to Sierra San Pedro Martir, Lower California. Type locality: Mount Pinos. July–Aug.

59. *Penstemon gracilentus* A. Gray. Slender *Penstemon*. Fig. 4696.

Penstemon gracilentus A. Gray, Pacif. R. Rep. 6^o: 82. 1857.

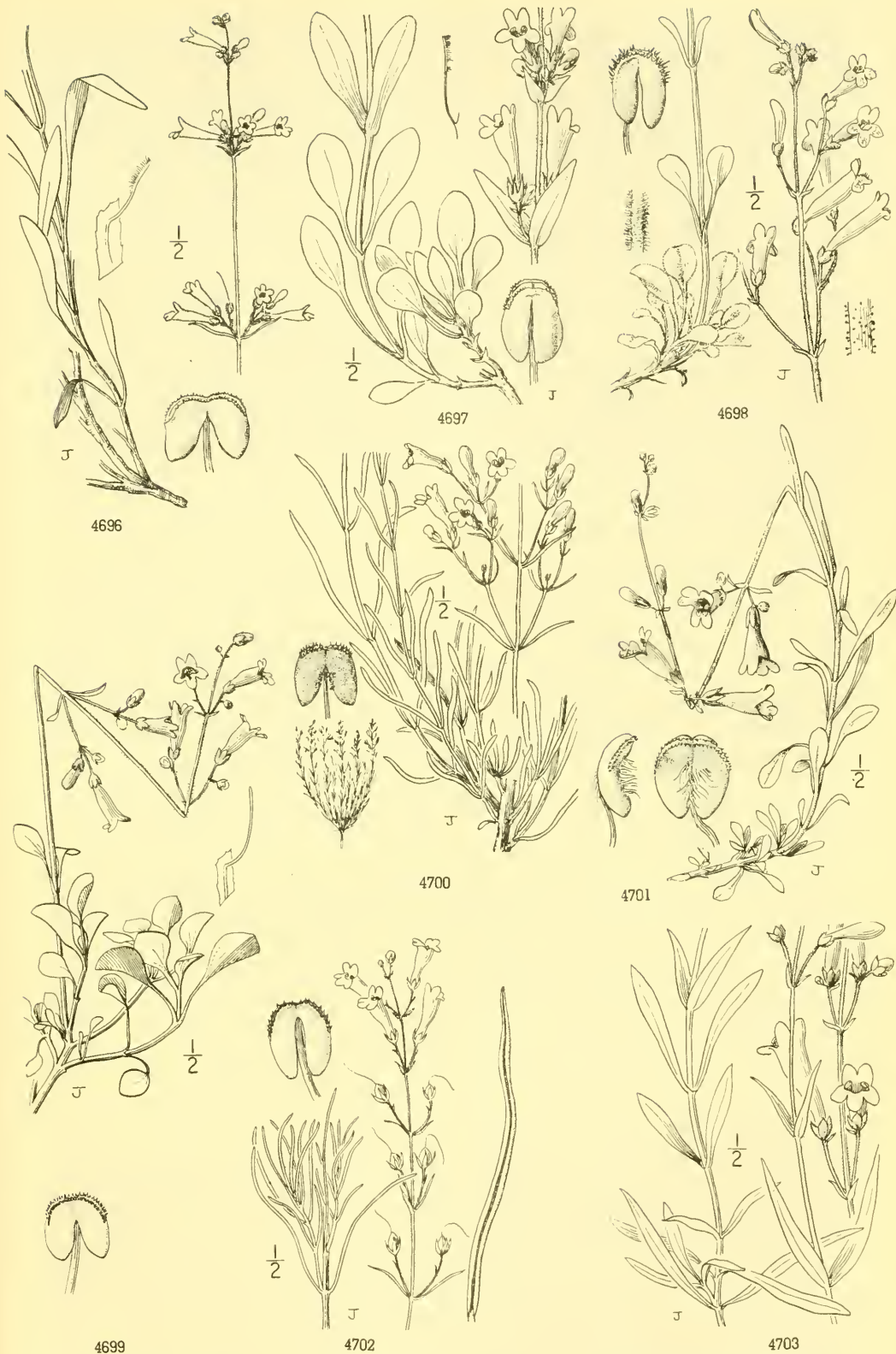
Stems numerous from a compact crown, 2–7 dm. high, the bright green or sometimes glaucescent herbage glabrous below the moderately glandular-pubescent inflorescence. Leaves entire, thin, mostly basal, the basal oblanceolate, on short slender petioles, 3–10 cm. long, 10–18 mm. wide, the cauline linear-lanceolate; thyrsus a compact panicle of about 3–5 nodes; calyx 3.5–5 mm. high, the lobes lanceolate to oblong-ovate; corolla purplish blue to red-purple, 13–16 mm. long, 4–5 mm. wide pressed, slightly ampliate, moderately 2-lipped, the projecting lower lip villous within; anther-sacs black-purple, glabrous except for the minute teeth along the suture, about 1 mm. long, dehiscent for less than half their length; staminode yellow-bearded for 4–5 mm. $n = 8$.

Rather dry soils, open coniferous woods, Canadian and Hudsonian Zones; southern Lake County, Oregon, through the mountains to Lake Tahoe, California, and adjacent Nevada. Type locality: "At the base of Lassen's butte, N. California." June–Aug.

60. *Penstemon papillatus* J. T. Howell. Inyo *Penstemon*. Fig. 4697.

Penstemon papillatus J. T. Howell, Leaflets West. Bot. 2: 119. 1938.

Stems few, erect, 2–4 dm. high, the gray-green herbage moderately cinereous-puberulent up



4696. *Penstemon gracilentus*
 4697. *Penstemon papillatus*
 4698. *Penstemon scapoides*

4699. *Penstemon caesius*
 4700. *Penstemon Cusickii*
 4701. *Penstemon laetus*

4702. *Penstemon filiformis*
 4703. *Penstemon neotericus*

to the glandular-pubescent inflorescence. Leaves moderately thick, the basal elliptic to spatulate-obircular, drawn down to a narrowly winged petiole, up to 6 cm. long, 1-2.5 cm. wide, the cauline oblanceolate or oblong, obtuse, the uppermost lanceolate; thyrsus a compact panicle of 3-6 nodes, the flowers short-pedicelled; calyx 7-10 mm. high, the lobes lanceolate, attenuate; corolla purplish blue, 24-30 mm. long, 5-10 mm. wide pressed, moderately amplate particularly dorsally, the erect upper lip exceeded by the spreading lower one, glabrous within; anther-sacs pale, 1.5-1.9 mm. long, glabrous except for the minute teeth along the suture, dehiscent for less than half their length; staminode prominently yellow-bearded for about 5 mm.

Open rocky slopes and under pines, Canadian Zone; flank of the Sierra Nevada in Mono and Inyo Counties, California. Type locality: "south end of Long Valley near Hilton Creek, Mono County." June-July.

61. *Penstemon scapoïdes* Keck. Piñon Penstemon. Fig. 4698.

Penstemon scapoïdes Keck, Univ. Calif. Pub. Bot. 16: 379. 1932.

Stems few, from a branching matted caudex, erect, 2-4 dm. high, glabrous, glaucous. Leaves almost all basal, ovate to subrotund, often folded, on petioles as long as the blade, densely canescent, 1.5-3 cm. long, 5-10 mm. wide, the cauline much-reduced, with very long internodes, the uppermost linear-lanceolate and glabrous; thyrsus moderately glandular-pubescent, a few-flowered lax panicle, the flowers borne singly on ascending pedicels; calyx 3-4.5 mm. high, the lobes oblong to broadly ovate, abruptly acute; corolla pale lilac, the tube darker, the throat whitish beneath and within, 26-34 mm. long, 5-7.5 mm. wide pressed, only slightly amplate, the lower lip somewhat exceeding the upper, the 2-ridged palate yellow-hairy; anther-sacs pale, 1.5-1.7 mm. long, glabrous except for the prominent short teeth along the suture, dehiscent for less than half their length; staminode moderately yellow pilose but not at very tip. $n = 8$.

Rocky canyons, Upper Sonoran Zone; White and Inyo Mountains, Inyo County, California. Type locality: Westgard Pass. June-July.

62. *Penstemon caësius* A. Gray. Cushion Penstemon. Fig. 4699.

Penstemon caësius A. Gray, Proc. Amer. Acad. 19: 92. 1883.

Loosely cespitose, with a lignescent matted caudex, the herbage yellow- or blue-green, glaucous, glabrous except for the moderately glandular-pubescent inflorescence, the erect stems 1.5-4.5 dm. high. Leaves mostly basal, coriaceous, the basal with mostly rotund blades 1-2 cm. long on slender petioles about as long, the cauline distant, reduced, becoming narrowly oblanceolate above; thyrsus a rather lax few-flowered panicle; calyx 4-7 mm. high, the lobes oblong or ovate, obtuse or abruptly acute; corolla purplish blue, 17-23 mm. long, 4.5-6.5 mm. wide pressed, gradually amplate, the lips equal, small, the throat glabrous within; anther-sacs pale, 1.3-1.5 mm. long, glabrous except for the prominent short teeth along the suture, dehiscent half their length; staminode glabrous.

Dry rocky slopes, Transition and Canadian Zones; southern Sierra Nevada and the San Gabriel and San Bernardino Mountains, California. Type locality: San Bernardino Mountains. June-Aug.

63. *Penstemon Cusickii* A. Gray. Cusick's Penstemon. Fig. 4700.

Penstemon Cusickii A. Gray, Proc. Amer. Acad. 16: 106. 1880.
Penstemon Macbridei A. Nels. Bot. Gaz. 52: 272. 1911.

Stems clustered, 2-4 dm. high, the herbage gray-green, hirtellous throughout. Leaves all of one kind or nearly so, evenly distributed, linear to narrowly oblanceolate or some of lower spatulate, 3-6.5 cm. long, 2-8 mm. wide; thyrsus narrow, sometimes congested, the peduncles usually appressed; calyx 3.5-7 mm. high, glabrous or minutely puberulent, the lobes broadly lanceolate to orbicular, acuminate or abruptly acute; corolla purple to blue, 16-22 mm. long, 6-8 mm. wide pressed, the tube (nearly twice as long as the calyx) rapidly expanding into the ample throat, the gaping limb obviously bilabiate, glabrous; anther-sacs black-purple, 1.3-1.9 mm. long, glabrous or microscopically pruinose, sparingly short-hispid at sinus, dehiscent less than half their length, the thickened margin prominently but sparsely spinulose; staminode spatulate-dilated at tip, glabrous. $n = 8$.

Dry light soils, Upper Sonoran Zone; Baker County to Harney County, Oregon, east to western Idaho. Type locality: "On the banks of Powder River or Eagle Creek, N.E. Oregon." May-June.

64. *Penstemon laëtus* A. Gray. Gay Penstemon. Fig. 4701.

Penstemon laëtus A. Gray, Proc. Bost. Soc. Nat. Hist. 7: 147. 1859.

Subshrub 2-8 dm. high, the herbage gray- or yellow-green, mostly densely puberulent or canescent, the stems often becoming purplish, the inflorescence always glandular-pubescent. Leaves linear to oblanceolate, the upper lanceolate, 2-10 cm. long, 2-12 mm. wide; thyrsus somewhat lax but rather narrow, few- to many-flowered; calyx 4-8 mm. high, the lobes lanceolate to narrowly ovate or oblong, acuminate to acute; corolla blue-lavender to blue-violet, with bright blue limb, 20-30 mm. long, 8-12 mm. wide pressed, tubular-campanulate, the 2-lipped limb widely gaping, glabrous within; anthers tinged with purple, broadly oval or ovate in outline, 2-2.8 mm. long, about as broad as long, often arcuate, white-hirsute (rarely glabrous) at sinus, the sacs dehiscent one-half to three-fifths their length, the suture margin densely spinose; staminode glabrous, narrowly spatulate-dilated at tip. $n = 8$.

In chaparral or on dry, wooded slopes, Upper Sonoran and Transition Zones; western slopes of the Sierra Nevada, California, from Yuba County south to the Tehachapi Mountains and Frazier Mountain, Ventura County. Type locality: Fort Tejon and vicinity. May-July.

Penstemon laëtus subsp. *leptosépalus* (Greene) Keck, Univ. Calif. Pub. Bot. 16: 393. 1932. (*Penstemon*

laetus var. *leptosepalus* Greene ex A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 442. 1886.) Leaves 3–12 cm. long, 4–15 mm. wide; calyx 8–15 mm. high, the lobes linear-lanceolate, attenuate. Chapparral slopes, in rocky or sandy soil, Upper Sonoran and Transition Zones; Tehama County to Placer County, California. Type locality: Butte County.

Penstemon laetus subsp. *Roëzlii* (Regel) Keck, Univ. Calif. Pub. Bot. 16: 390. 1932. (*Penstemon Roëzlii* Regel, Gartenfl. 21: 239. 1872; *P. cinerascens* Greene, Leaflets Bot. Obs. 1: 161. 1906; *P. laetus* var. *Roëzlii* Jepson, Man. Fl. Pl. Calif. 916. 1925; *P. gracilentus* var. *ursorum* Jepson, loc. cit.) Leaves 2–7 mm. long, 2–12 mm. wide; calyx 4–7 mm. high; corolla 14–20 mm. long, 5–9 mm. wide pressed. Transition and Canadian Zones; central Oregon (Wheeler County), southward into the Cascade Range and Sierra Nevada, more commonly on the eastern slope, to Lake Tahoe and Mono County, California, and adjacent Nevada. Type locality: Sierra Nevada.

Penstemon laetus subsp. *sagittatus* Keck, Univ. Calif. Pub. Bot. 16: 395. 1932. (*Penstemon laetus* var. *sagittatus* McMinn, Ill. Man. Calif. Shrubs 518. 1939; *P. sagittatus* Pennell, Notulae Naturae 71: 15. 1941.) Leaves 2–7 cm. long, 2–4(–8) mm. wide; corolla 20–30 mm. long, 6–9 mm. wide pressed, the throat straight or incurved dorsally, ampliate ventrally, somewhat constricted at junction with lip, the lips moderately if at all spreading; anthers sagitate, often very slender, dehiscent three-fifths to four-fifths their length. Transition and Canadian Zones; Siskiyou Mountains, Oregon, and Modoc County to Del Norte and Humboldt Counties, California. Type locality: Mount Shasta.

65. *Penstemon filifórmis* (Keck) Keck. Thread-leaved Penstemon. Fig. 4702.

Penstemon laetus subsp. *filiformis* Keck, Univ. Calif. Pub. Bot. 16: 394. 1932.

Penstemon laetus var. *filiformis* McMinn, Ill. Man. Calif. Shrubs 517. 1939.

Open subshrub, very woody at base, 2–5 dm. high, the herbage bright green and glabrous below the glandular-pubescent inflorescence, or the slender stems puberulent. Leaves all of one kind, filiform, tightly involute, 2–7 cm. long, 0.5–1 mm. wide (or when occasionally flat up to 2 mm. wide), the lower ones bearing fascicles in their axils; thyrsus strict, subracemose, the short spreading peduncles mostly 1-flowered; calyx 3.5–5 mm. high, the lobes lanceolate, acuminate; corolla deep blue with purple tube, 14–18 mm. long, 5–7 mm. wide pressed, gaping; anthers inverted U-shaped, 1.5–1.6 mm. long, merely scabrid at sinus and moderately spinulose at suture, dehiscent half their length. $n = 8$.

Open rocky gulches and flats, Transition Zone; Sacramento River Canyon, Shasta County, California. Type locality: between Lamoine and Sims. June.

66. *Penstemon neotéricus* Keck. Derived Penstemon. Fig. 4703.

Penstemon neotericus Keck, Univ. Calif. Pub. Bot. 16: 398. 1932.

Subshrub 2–6 dm. high, the herbage glabrous and blue-glaucous below the glandular-pubescent inflorescence, the stems numerous and erect. Leaves crowded toward base of stems, more lax above, coriaceous, the basal narrowly oblanceolate to spatulate, 2–6 cm. long, 3–9 mm. wide, the cauline lanceolate to narrowly ovate, the uppermost amplexicaul; thyrsus strict, usually elongated, the 1- to 2-flowered peduncles divergent; calyx 4–7 mm. high, the lobes lanceolate to ovate-oblong; corolla blue-purple, the limb azure, the buds yellowish, 25–35 mm. long, 8–12 mm. wide pressed, tubular-campanulate, gaping, glabrous within; anthers narrowly cordate, 2.5–3.2 mm. long, not as wide, white-hirsute at sinus, the sacs dehiscent one-half to three-fourths their length, the suture margin densely spinose; staminode glabrous, scarcely at all dilated. $n = 32$.

Dry pine woods, Transition Zone; Lassen and Shasta Counties to Sierra County, California. Type locality: halfway between Chester and Westwood, Plumas County. May–Aug. This species is an amphiploid derivative of *P. laetus* and *P. azureus*.

67. *Penstemon azureus* Benth. Azure Penstemon. Fig. 4704.

Penstemon azureus Benth. Pl. Hartw. 327. 1849.

Penstemon glaucifolius A. Gray, Pacif. R. Rep. 6³: 82. 1857.

Penstemon Jeffreyanus Hook. Bot. Mag. 84: pl. 5045. 1858.

Penstemon azureus var. *Jeffreyanus* A. Gray, Bot. Calif. 1: 561. 1876.

Penstemon heterophyllus var. *azureus* Jepson, Man. Fl. Pl. Calif. 917. 1925.

Subshrub 2–5 dm. high, the herbage blue-glaucous and glabrous throughout. Basal leaves oblanceolate to obovate, short-petiolate, 1.5–6 cm. long, 5–18 mm. wide, the cauline lanceolate to oblong or ovate, obtuse, acute, or acuminate, amplexicaul; thyrsus strict, subsecund, the peduncles erect; calyx 3.5–6 mm. high, the lobes oblong or obovate, abruptly contracted to a cuspidate or mucronate tip, sometimes acuminate; corolla deep blue-purple, the buds yellowish, 20–30 mm. long, 7–12 mm. wide pressed, tubular-campanulate, gaping, glabrous; anthers cordate, as broad as long, 2.2–3.3 mm. long, more or less hirsute at sinus, the sacs dehiscent one-half to three-fourths their length, the suture margin densely spinose; staminode dilated at the usually glabrous tip. $n = 24$.

Chaparral openings and forested slopes, lower Transition Zone to upper Canadian Zone; southwestern Oregon to Humboldt, Glenn, and Placer Counties, California, rare southward to Fresno County. Type locality: dry streams of the Sacramento Valley. May–Aug.

Penstemon azureus subsp. *angustissimus* (A. Gray) Keck, Univ. Calif. Pub. Bot. 16: 402. 1932. (*Penstemon azureus* var. *angustissimus* A. Gray, Syn. Fl. N. Amer. 2¹: 272. 1878.) Herbage paler yellow-green; leaves very narrow, 2–7 cm. long, the lower 2–5 mm. wide, the uppermost 3–9 mm. wide and widest at the sessile base; calyx-lobes oblong or obovate, extending into an abrupt subulate tip 1–3 mm. long. Sierran foothills from Butte to Fresno Counties, California; rare in western Glenn County. Type locality: Yosemite Valley.



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4705



4706



4707



4708



4709

4704. *Penstemon azureus*
4705. *Penstemon parvulus*

4706. *Penstemon heterophyllus*
4707. *Penstemon Purpusii*

4708. *Penstemon serrulatus*
4709. *Penstemon venustus*

68. *Penstemon párvulus* (A. Gray) Krautter. Small Azure Penstemon. Fig. 4705.

Penstemon azureus var. *parvulus* A. Gray, Syn. Fl. N. Amer. 2¹: 272. 1878.
Penstemon parvulus Krautter, Contr. Bot. Lab. Univ. Penn. 3: 193. 1908.
Penstemon jeffreyanus var. *parvulus* Jepson, Man. Fl. Pl. Calif. 917. 1925.
Penstemon azureus subsp. *parvulus* Keck, Univ. Calif. Pub. Bot. 16: 406. 1932.

Resembling *P. azureus* in general aspect, the stems woody at base and often creeping, 2–3.5 dm. high, the herbage blue-glaucous and glabrous throughout. Basal leaves narrowly to broadly oblanceolate or spatulate, petiolate, 1–3.5 cm. long, 2–5(–8) mm. wide, the cauline lanceolate to oblong or narrowly ovate, semialexicaul, up to 10 mm. wide; calyx-lobes lanceolate to oblong, elliptic or oval, obtuse or acute, often mucronate or acuminate; corolla 14–20 mm. long; anthers 1.4–1.8 mm. long; otherwise as in *P. azureus*. *n* = 16.

Rocky slopes, Canadian Zone; Siskiyou Mountains of southwestern Oregon to the Scott Mountains, Trinity County, California, reappearing in the high Sierra Nevada of Fresno and Tulare Counties, California. Type locality: mountains above Jackson Lake, California. June–Aug.

69. *Penstemon heterophyllus* Lindl. Foothill Penstemon. Fig. 4706.

Penstemon heterophyllus Lindl. Bot. Reg. 22: pl. 1899. 1836.
Penstemon leucanthus Greene, Pittonia 1: 72. 1887.

Shrub 3–5 dm. high, glabrous throughout or occasionally minutely puberulent at base of stems, green or glaucous. Leaves linear, tapering to base and apex, usually fasciculate, 2–3(–5) cm. long, 2–4 mm. wide; thyrsus strict, subracemose, glabrous; calyx 4–6 mm. high, the lobes mostly oblanceolate to obovate with abruptly acuminate or subulate tip, glabrous; corolla rose-violet, with blue or lilac lobes, the buds yellowish, 25–35 mm. long, 9–12 mm. wide pressed, gaping, glabrous; anthers sagittate, arcuate, about 2.5 mm. long, about two-thirds as wide, usually hirsute at sinus, the sacs dehiscent three-fourths to four-fifths their length, the suture margin conspicuously spinose; staminode moderately dilated at the glabrous tip. *n* = 8, 16.

Dry hillsides, Upper Sonoran and Transition Zones; Coast Ranges of California from Humboldt County to San Diego County. Type locality: California. April–July.

Penstemon heterophyllus subsp. *Purdyi* Keck, Univ. Calif. Pub. Bot. 16: 409. 1932. (*Penstemon heterophyllus* var. *Purdyi* McMinn, Ill. Man. Calif. Shrubs 518. 1939.) Shrub 2.5–7 dm. high, puberulent throughout; leaves larger, 2.5–6(–9) cm. long, 3–6(–9) mm. wide, rarely fasciculate; calyx-lobes lanceolate or ovate, acute or acuminate, glabrous, or sometimes puberulent. Rare in the Sierran foothills of California from Butte County to Placer County; common in the North Coast Ranges from Trinity and Humboldt Counties to San Benito County. Type locality: Mount Hamilton.

Penstemon heterophyllus subsp. *australis* (Munz & Jtn.) Keck, Univ. Calif. Pub. Bot. 16: 411. 1932. (*Penstemon heterophyllus* var. *australis* Munz & Jtn. Bull. S. Calif. Acad. 23: 40. 1924.) Puberulent almost throughout, usually densely so; leaves narrow, fasciculate, more crowded toward base of stems; calyx-lobes lanceolate to narrowly ovate, usually puberulent. Chaparral belt from Monterey County to San Diego County. Type locality: Claremont.

70. *Penstemon Purpusii* Brandg. Purpus' Penstemon. Fig. 4707.

Penstemon Purpusii Brand. Bot. Gaz. 27: 455. 1899.

Plant 1–2 dm. high from a woody crown, the older stems spreading and rooting, the newer shoots decumbent or ascending, up to 3 dm. long, the herbage densely canescent except for the glandular-pubescent inflorescence. Leaves mostly entire but some shallowly dentate, the lower oval to rotund with petiole half as long as blade, the upper oval, oblanceolate or lanceolate, all 1–2 cm. long; thyrsus crowded, short; calyx 5–10 mm. high, the lobes linear-lanceolate to broadly oval, attenuate to obtuse; corolla (and buds) violet shading to blue, 20–30 mm. long, 5–8 mm. wide pressed, the ample throat slightly constricted at orifice, the lips scarcely spreading, glabrous within; anthers sagittate, arcuate, 2.5–2.8 mm. long, 1.5 mm. wide, hirsute at sinus, the sacs dehiscent three-fourths their length, the suture margin densely spinose; staminode glabrous, apically dilated.

Rocky ridges, Transition and Canadian Zones; North Coast Range peaks of California from Humboldt and Trinity Counties to Lake County. Type locality: Snow Mountain, Lake County. June–Aug.

71. *Penstemon serrulatus* Menz. Cascade Penstemon. Fig. 4708.

Penstemon serrulatus Menz. ex Smith in Rees, Cycl. 26: No. 5. 1813.
Penstemon diffusus Dougl. ex Lindl. Bot. Reg. 14: pl. 1132. 1828.

Subshrub 3–7 dm. high, the herbage often glabrous below, usually puberulent above, particularly on stems and within inflorescence. Leaves subentire to irregularly serrate, dentate, or shallowly lacinate, 2–9 cm. long, 6–45 mm. wide, the basal broadly lanceolate, elliptic, or spatulate, short-petiolate, the upper cauline broadly lanceolate to cordate; thyrsus narrow, of 1–5 dense clusters, their peduncles erect; calyx 6–11 mm. high, the lobes linear-lanceolate to ovate, usually ciliate, the wider ones often lacinate; corolla deep blue to dark purple, 16–23 mm. long, 6–9 mm. wide pressed, tubular-campanulate, often sparsely pubescent at base of lower lip; anthers broader than long, 1.3–1.6 mm. long, scabro-hispidulous at sinus, the sacs dehiscent less than half their length, the suture margin sparsely spinulose; staminode yellow-bearded. *n* = 8.

Moist woods, Humid Transition Zone; mostly west of the crest of the Cascade Mountains from southern Alaska to northwestern Oregon. Type locality: "N.W. Coast of America," Menzies. June–Aug.

72. *Penstemon venustus* Dougl. Lovely Penstemon. Fig. 4709.

Penstemon venustus Dougl. ex Lindl. Bot. Reg. 16: pl. 1309. 1830.

Subshrub 3-8 dm. high, the herbage glabrous except for lines of puberulence along the stems, often glaucescent. Leaves regularly and finely serrulate or toothed, these teeth often pungent and uncinat, 2-12 cm. long, 3-35 mm. wide, elliptic or oblong to lanceolate, even the basal scarcely petiolate; thyrsus a continuous spike-like panicle, subsecund, the peduncles erect; calyx 3-6 mm. high, the lobes lanceolate, ovate, or obovate, with scarious to erose or shallowly toothed margin; corolla light violet to violet-purple, 20-32 mm. long, 8-12 mm. wide pressed, glabrous without and within, the ample lobes ciliate; anthers somewhat exserted, 1.6-2.1 mm. long, not quite so broad, hirsute ventrally near sinus, the sacs dehiscent one-third to one-half their length, the suture margin rather sparsely spinose; staminode, together with the fertile filaments, white-hirsute toward tip. $n = 32$.

Rocky slopes, Transition and Canadian Zones; Blue and Wallowa Mountains of Washington and Oregon, east to north central Idaho. Type locality: "Found by Mr. Douglas in the dry channels of rivers among the mountains of North-west America." June-Sept.

73. *Penstemon Richardsonii* Dougl. Cut-leaved Penstemon. Fig. 4710.

Penstemon Richardsonii Dougl. ex Lindl. Bot. Reg. 13: pl. 1121. 1827.

Penstemon Pickettii St. John, Proc. Biol. Soc. Wash. 44: 33. 1931.

Subshrub 2-8 dm. high, the herbage almost glabrous to densely canescent, the inflorescence glandular-pubescent. Leaves coarsely but acutely serrate to pinnately parted, the lobes again parted or toothed, narrowly lanceolate to narrowly ovate, 2-8 cm. long, 8-20 mm. wide; thyrsus racemose to openly much branched, the peduncles usually divergent; calyx 4-9 mm. high, the lobes lanceolate to broadly ovate; corolla pink to rose-lilac or bluish, the guide lines prominent, 18-30 mm. long, 7-12 mm. wide pressed, the lower lip sometimes sparsely bearded within; anthers somewhat exserted, broader than long, 1.3-1.8 mm. long, glabrous, the sacs dehiscent one-third to one-half their length, the suture margin sparsely to densely spinulose; staminode sparsely to densely yellow-bearded, usually well-exserted. $n = 8$.

Cliffs and rock slides, Humid and Arid Transition Zones; eastern and central Washington and adjacent British Columbia to central Oregon east of the Cascades, and through the Columbia Gap to the lower Willamette River. Type locality: "on bare dry rocks, in the vicinity of the Columbia and its branches." June-Aug.

74. *Penstemon triphyllus* Dougl. Whorled Penstemon. Fig. 4711.

Penstemon triphyllus Dougl. ex Lindl. Bot. Reg. 15: pl. 1245. 1829.

Subshrub 3-8 dm. high, the herbage more or less puberulent below the glandular-pubescent inflorescence. Leaves in 3's, subverticillate, subtentire to sharply pinnately toothed or cleft, linear to narrowly lanceolate, 2-5 cm. long, 1-6 mm. wide; thyrsus rather open, often elongated; calyx 4-6 mm. high, the lobes lanceolate to ovate; corolla pale lavender to lilac-blue, the guide lines prominent, 13-17 mm. long, 3.5-5 mm. wide pressed, the throat gradually ampliate from a long tube, the lower lip sometimes sparsely bearded within; anthers as broad as long, 0.9-1.3 mm. long, glabrous, the sacs dehiscent about one-third their length, the suture margin sparsely spinulose; staminode densely bearded with fine yellow hairs. $n = 8$.

Basalt cliffs, Upper Sonoran Zone; Snake River and its tributaries, eastern Washington and Oregon, to western Idaho. Type locality: "Blue Mountains of North-west America." May-June.

75. *Penstemon glandulosus* Dougl. Glandular Penstemon. Fig. 4712.

Penstemon glandulosus Dougl. ex Lindl. Bot. Reg. 15: pl. 1262. 1829.

Penstemon staticifolius Lindl. Bot. Reg. 21: pl. 1770. 1836.

Stout-stemmed herb 5-10 dm. high, glandular-pubescent throughout with short soft hairs, the inflorescence more viscid. Leaves thin, soft, sharply serrulate or serrate, the basal lanceolate to elliptic, with petiole half as long, together 5-25 cm. long, 1.5-6 cm. wide, the upper cauline lance-ovate to cordate, amplexicaul, very gradually reduced within the inflorescence of 2-5 remote congested clusters; calyx 10-15 mm. high, the lobes lanceolate, acute to attenuate; corolla pale lilac to light violet, 28-40 mm. long, 11-15 mm. wide pressed, usually glabrous within; anthers suborbicular in outline, broader than long, 1.7-2.2 mm. long, muriculate, the sacs dehiscent about one-half their length, the few teeth along the suture prominent; staminode glabrous.

Grassy hillsides, Arid Transition Zone; at isolated localities along the Columbia and Snake River canyons, southern Washington, northern and eastern Oregon, and western Idaho. Type locality: indefinite, but collected by Douglas. May-July.

Penstemon glandulosa subsp. *chelanensis* Keck. All the leaves entire or very nearly so; otherwise like the typical species. On hillsides, Arid Transition Zone; region about Wenatchee, Chelan County, Washington, May.

Foliis integerrimis.

Type collected along Colocockum Creek, 4 miles from mouth, Chelan County, Washington, May 2, 1946, G. H. Ward 315 (State College of Washington).

76. *Penstemon Bridgèsii* A. Gray. Bridges' Penstemon. Fig. 4713.

Penstemon Bridgesii A. Gray, Proc. Amer. Acad. 7: 379. 1868.

Subshrub 3-10 dm. high, the herbage yellow-green, seldom glaucous, glabrous or pruinose-puberulent below the moderately glandular-pubescent inflorescence. Leaves 2-8 cm. long, 2-12 mm. wide, the basal linear-oblancoelate to spatulate, obtuse, petiolate, the upper cauline linear

to narrowly elliptic, acute, sessile; thyrsus subsecund, often rather narrow and loose; calyx 4–8 mm. high, the lobes lanceolate to narrowly ovate; corolla vermilion to scarlet, 22–35 mm. long, 4–6 mm. wide pressed, tubular, sparingly glandular both without and within, the upper lip erect, the lower lip sharply reflexed; anthers oblong or ovate in outline, 2–2.2 mm. long, microscopically muriculate, the sacs dehiscent one-four to one-third their length, the suture finely and densely spinulose-ciliate; staminode glabrous. $n = 8$.

Canyon sides, Upper Sonoran, Arid Transition, and Canadian Zones; eastern and southern California from Alpine County to San Diego County, adjacent Lower California, east to Colorado and Arizona. Type locality: California. June–Aug.

77. *Penstemon personatus* Keck. Closed Penstemon. Fig. 4714.

Penstemon personatus Keck, Madroño 3: 248. 1936.

Perennial herb 3–5.5 dm. high, with few erect stems. Leaves not crowded, entire or obscurely denticulate, glaucescent, glabrate above, puberulent beneath, ovate or ovate-oblong, 3–6.5 cm. long, 1.2–3.5 cm. wide, the lower short-petiolate; thyrsus lax, 7–25 cm. long, glandular-pubescent, the peduncles divergent; calyx 5–6 mm. high, the lobes ovate-lanceolate, abruptly long-acuminate; corolla blue-purple(?), personate, 20–25 mm. long, glabrous or sparsely viscid without, densely bearded on all sides within, the limb short; anther-sacs divaricate, sub-explanate, glabrous, 1.2–1.4 mm. long; staminode scarcely 4 mm. long, densely yellow-bearded at the tip.

Dry hillsides, Arid Transition Zone; known only from three local colonies in the Sierra Nevada of Butte County, California. Type locality: Flea Valley. July.

78. *Penstemon Bárrettiae* A. Gray. Barrett's Penstemon. Fig. 4715.

Penstemon Barrettiae A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 440. 1886.

Shrubby below, much branched, forming wide dense clumps 2–4 dm. high. Leaves blue-glaucous, ovate or elliptic-ovate, serrate, glabrous, the larger 4–6 cm. long, 2–2.5 cm. wide, the basal short-petiolate, the upper cauline amplexicaul; thyrsus 7–25 cm. long, dense, subracemose, the peduncles 1–3-flowered; calyx 6–7 mm. high, the lobes ovate, acute to acuminate; corolla lilac or rose-purple, 33–38 mm. long, 8–12 mm. wide pressed, the rather short lips projecting, the ventral ridges copiously villous; anthers densely woolly, included; staminode one-half to three-fifths the length of fertile filaments, slender, glabrous or nearly so. $n = 8$.

Basaltic cliffs and talus, Arid Transition Zone; Columbia River Gap in Klickitat County, Washington, and Wasco and Hood River Counties, Oregon. Type locality: "Mountains of Hood River, Oregon, near its confluence with the Columbia." April–June.

79. *Penstemon fruticosus* (Pursh) Greene. Shrubby Penstemon. Fig. 4716.

Gerardia fruticosa Pursh, Fl. Amer. Sept. 2: 423, pl. 18. 1814.

Dasanthera fruticosa Raf. Amer. Month. Mag. 2: 267. 1818.

Penstemon crassifolius Lindl. Bot. Reg. 24: pl. 16. 1838.

Penstemon Douglasii Hook. Fl. Bor. Amer. 2: 98. 1838.

Penstemon Lewisii Benth. in A. DC. Prod. 10: 321. 1846.

Penstemon Menziesii var. *Lewisii* A. Gray, Proc. Amer. Acad. 6: 56. 1862.

Penstemon Menziesii var. *Douglasii* A. Gray, op. cit. 57.

Penstemon fruticosus Greene, Pittonia 2: 239. 1892.

Penstemon adamsianus Howell, Fl. N.W. Amer. 511. 1901.

Penstemon Menziesii var. *crassifolius* Schelle, Handb. Laubh. Benen. 432. 1903.

Penstemon fruticosus var. *crassifolius* Krautter, Contr. Bot. Lab. Univ. Penn. 3: 100. 1908.

Shrubby at base, forming wide dense clumps 1–4 dm. high, glabrous or pruinose up to the moderately glandular-pubescent inflorescence. Leaves coriaceous, green, usually lustrous, narrowly lanceolate or oblanceolate to elliptic, acute or obtuse, even the cauline ones mostly narrowed to the base, entire or somewhat serrulate or denticulate, 1–5 cm. long, 5–15 mm. wide, much reduced below the inflorescence; raceme rather dense, strict, subsecund; calyx 7–10 mm. high, the lobes lanceolate to lance-ovate, acuminate to caudate; corolla bright lavender-blue, 25–38 mm. long, 7–12 mm. wide pressed, the ventral ridges villous; staminode about one-half the length of fertile filaments, very slender, yellow-bearded. $n = 8$.

Rocky slopes in open coniferous woods, Arid Transition Zone to Hudsonian Zone; east of the crest of the Cascades, central Washington to central Oregon, east to Montana and Wyoming. Type locality: "Rocky Mountains." May–July. A variable species of which the following two segregates are the least indistinct.

Penstemon fruticosus subsp. *Scouleri* (Lindl.) Pennell & Keck. (*Penstemon Scouleri* Lindl. Bot. Reg. 15: pl. 1277. 1829; *P. Menziesii* var. *Scouleri* A. Gray, Pacif. R. Rep. 6³: 82. 1857.) Leaves linear-lanceolate, subentire to sharply serrate, mostly 2–5 mm. wide; calyx-lobes 10–15 mm. long, linear-lanceolate, attenuate-caudate; corolla 35–50 mm. long, 11–15 mm. wide pressed. Northern Washington (Okanogan County to Pend Oreille County) to northern Idaho and British Columbia. Type locality: Kettle Falls of the Columbia.

Penstemon fruticosus subsp. *serratus* Keck. A low very shrubby form mostly 1–2 dm. high, the leaf-blades narrowly to broadly elliptic, evenly and prominently serrate-dentate throughout, the larger 1.5–2.5 cm. long, 4–8 mm. wide. Rocky outcrops, Transition and Canadian Zones; Blue Mountains of southeastern Washington, Wallowa Mountains, Oregon, and western Idaho.

Fruticosus, 1–2 dm. altus; foliis ellipticis acute serrato-dentatis, 1.5–2.5 cm. longis, 4–8 mm. latis.

Type collected on a rocky cliff, headwaters of Sheep Creek, Seven Devils Mountains, Idaho County, Idaho, Marion Ownbey & Fred G. Meyer 2068 (Dudley Herbarium).



4710



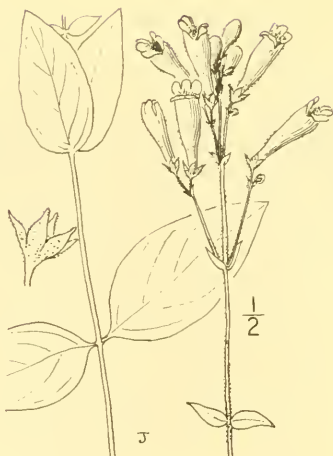
4711



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4710. *Penstemon richardsonii*
4711. *Penstemon triphyllus*

4712. *Penstemon glandulosus*
4713. *Penstemon bridgesii*

4714. *Penstemon personatus*
4715. *Penstemon barrettiae*



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4716. *Penstemon fruticosus*
 4717. *Penstemon Cardwellii*
 4718. *Penstemon Newberryi*

4719. *Penstemon rupicola*
 4720. *Penstemon Menziesii*

4721. *Penstemon nemorosus*
 4722. *Penstemon Rothrockii*

80. *Penstemon Cardwellii* Howell. Cardwell's Penstemon. Fig. 4717.

Penstemon Cardwellii Howell, Fl. N.W. Amer. 510. 1901.

Penstemon fruticosus subsp. *Cardwellii* Piper, Contr. U.S. Nat. Herb. 11: 499. 1906.

Wide clumps 1–2 or 3 dm. high, glabrous below, the inflorescence sparsely glandular-puberulent. Leaves narrowly to broadly elliptic, evenly and rather remotely serrate or serrulate, 1.5–4 cm. long, 7–15 mm. wide; raceme strict, few- to several-flowered; calyx 8–12 mm. high, the lobes lanceolate to ovate, acute to attenuate; corolla bright purple, 25–38 mm. long, 7–12 mm. wide pressed, the ventral ridges villous; staminode one-half to three-fifths the length of fertile filaments, very slender, yellow-bearded. $n = 8$.

Dry wooded slopes, Humid Transition and Canadian Zones; west of the crest of the Cascades, Skamania County, Washington, to Josephine and Curry Counties, Oregon. Type locality: base of Mount Hood. May–Aug.

81. *Penstemon Newberryi* A. Gray. Mountain Pride. Fig. 4718.

Penstemon Newberryi A. Gray, Pacif. R. Rep. 6³: 82. pl. 14. 1857.

Penstemon Menziesii var. *Robinsonii* Masters, Gard. Chron. 1872: 969. f. 227. 1872.

Penstemon Menziesii var. *Newberryi* A. Gray, Syn. Fl. N. Amer. 2¹: 259. 1878.

Stems woody below, decumbent or creeping, forming mats 1.5–3 dm. high, glabrous or feebly pruinose below the glandular-pubescent inflorescence, green or glaucescent. Leaves coriaceous, elliptic to ovate, obtuse, mostly short-petioled, serrulate, the larger 1.5–4 cm. long, 8–16 mm. wide, much reduced on the flowering stems; raceme short, dense, subsecund; calyx 7–12 mm. high, the lobes narrowly to broadly lanceolate, attenuate or acuminate; corolla rose-red, 22–30 mm. long, 5–8 mm. wide pressed, the throat only slightly dilated, the ventral ridges rather stiffly and densely bearded with short hairs; anthers exserted; staminode three-fourths the length of fertile filaments, very slender, yellow-bearded. $n = 8$.

Rock ledges and gravelly slopes, Transition Zone to Boreal Zone; California, from Mount Shasta through the higher Sierra Nevada to Tulare County; adjacent Nevada. Type locality: "Mt. St. Joseph's" (near Mount Lassen). June–Aug.

Penstemon Newberryi subsp. *Berryi* (Eastw.) Keck. (*Penstemon Berryi* Eastw. Bull. Torrey Club 32: 209. 1905.) Corolla 27–33 mm. long, 8–12 mm. wide pressed, the throat more amplate, the ventral ridges within bearded with longer more flexuous hairs; anthers included. Transition and Canadian Zones; Josephine County, Oregon, to Humboldt and Glenn Counties, California. Type locality: Canyon Creek, Trinity County, California.

Penstemon Newberryi subsp. *sonomensis* (Greene) Keck. (*Penstemon sonomensis* Greene, Pittonia 2: 218. 1891; *P. Newberryi* var. *sonomensis* Jepson, Fl. W. Mid. Calif. 401. 1901.) Floral leaves scarcely reduced in size; inflorescence very compact; corolla dark rose-purple. Peaks of Lake, Napa, and Sonoma Counties, California. Type locality: summit of Hood's Peak, Sonoma County.

82. *Penstemon rupicola* (Piper) Howell. Rock Penstemon. Fig. 4719.

Penstemon Newberryi var. *rupicola* Piper, Bull. Torrey Club 27: 397. 1900.

Penstemon rupicola Howell, Fl. N.W. Amer. 510. 1901.

Depressed mats, woody at base, with flowering stems mostly less than 1 dm. high, glabrous, or the stems, petioles, and under surface of leaves in particular more or less densely canescent, the inflorescence glandular-pubescent, the herbage usually very glaucous. Leaves elliptic to orbicular, very thick, all but the much-reduced floral leaves petioled, serrate-denticulate, 8–20 mm. long, 6–12 mm. wide; raceme condensed, few-flowered; calyx 6–10 mm. high, the lobes lanceolate to oblong, long-acuminate to acute; corolla deep rose, 27–35 mm. long, 8–12 mm. wide pressed, the throat moderately dilated, the ventral ridges sparsely villous; anthers slightly exserted; staminode one-half to three-fourths the length of fertile filaments, very feebly to densely bearded at the filiform tip. $n = 8$.

Rock clefts, Transition Zone to Canadian Zone; both slopes of the Cascades from central Washington to northernmost California. Type locality: Mount Rainier. May–Aug.

83. *Penstemon Menziesii* Hook. Creeping Penstemon. Fig. 4720.

Penstemon Menziesii Hook. Fl. Bor. Amer. 2: 98. 1838.

Creeping mats, woody at base, with flowering stems less than 1 dm. high, the stems puberulent. Leaves elliptic to orbicular, very thick, more or less glandular-punctate, glabrous, green, more or less serrate-denticulate, 5–15 mm. long, 4–7 mm. wide; raceme few-flowered, glandular-pubescent; calyx 7–11 mm. high, the lobes linear-lanceolate to broadly lanceolate; corolla purple-violet, 25–35 mm. long, 7–12 mm. wide pressed, the throat moderately dilated, the ventral ridges sparsely to rather densely villous; anthers included; staminode very short, barely one-half as long as fertile filaments, well-bearded. $n = 8$.

Rocky ledges, Hudsonian Zone; north coast of British Columbia south through the Cascades and coastal ranges to Kittitas and Lewis Counties, Washington. Type locality: Nutka, Vancouver Island. June–Aug.

Penstemon Menziesii subsp. *Davidsonii* (Greene) Piper, Contr. U.S. Nat. Herb. 11: 499. 1906. (*Penstemon Davidsonii* Greene, Pittonia 2: 241. 1892; *P. Menziesii* (var.) *Davidsonii* Piper, Mazama 2: 99. 1901.) Leaves all entire; corolla 18–35 mm. long. Boreal Zones; Mount Rainier, Washington, south through the Cascades and Sierra Nevada (also in Steen Mountains, Oregon) to Tulare County, California, and in adjacent Nevada. Type locality: Mount Conness, California.

Penstemon Menziesii subsp. *Thompsonii* Pennell & Keck. Plants larger and coarser, forming relatively lax mats, the flowering stems up to 1.5 dm. high; leaves all entire or very nearly so, 12–25 mm. long, 4–10 mm. wide; corolla 25–38 mm. long. Rocky slopes, Transition Zone to Hudsonian Zone; east of the crest of the Cascades from Okanogan County to Kittitas County, Washington.

Procumbens et repens, usque ad 15 cm. altus; foliis plerisque integerrimis glabris crassis oblanceolatis usque ad late ovalibus vel subrotundatis 12–25 mm. longis 4–10 mm. latis; corolla 25–38 mm. longa.

Type collected on rocky outcrops at head of Beverly Creek, Chelan County, Washington, at 5,200 feet elevation, J. William Thompson 6614 (Dudley Herbarium).

84. *Penstemon nemoròsus* (Dougl.) Trautv. Woodland Penstemon. Fig. 4721

Chelone nemorosa Dougl. ex Lindl. Bot. Reg. 14: pl. 1211. 1828.

Apentostera triflora Raf. New Fl. 2: 73. 1837.

Penstemon nemorosus Trautv. Bull. Acad. St. Pétersb. 5: 345. 1839.

Stems few, erect, from an unbranched woody caudex, puberulent, 3–8 dm. high. Leaves all cauline, equally spaced, thin, finely to coarsely serrate, lanceolate to ovate, mostly rounded at base, 5–10 cm. long, 1.5–4 cm. wide, glabrous, or more or less puberulent beneath; thyrsus glandular-pubescent, few-flowered and terminal, or more extensive and open and leafy; calyx 6–13 mm. high, the lobes lanceolate to ovate; corolla rose-purple to pale maroon-red, paler ventrally, 25–35 mm. long, 8–11 mm. wide pressed, strongly plicate but glabrous within, strongly 2-lipped, the lower lip much exceeding the upper; fertile filaments retrorsely puberulent above, hirsute at base, the staminode about two-thirds as long, densely short-bearded throughout. $n = 15$.

Woods, upper Transition Zone to Hudsonian Zone; largely west of the crest of the Cascades, Vancouver Island through Washington and Oregon to northernmost California. Type locality: in the northwest of North America. June–Aug.

85. *Penstemon Rothrockii* A. Gray. Rothrock's Penstemon. Fig. 4722.

Penstemon Rothrockii A. Gray, Syn. Fl. N. Amer. 21: 260. 1878.

Penstemon Shockleyi S. Wats. Proc. Amer. Acad. 23: 265. 1888.

Penstemon scabridus Eastw. Bull. Torrey Club 32: 208. 1905.

Low bush 3–6 dm. high, with numerous slender strict stems arising from the much branched woody base, puberulent throughout, the foliage sparsely scabridulous, the inflorescence more or less glandular. Leaves 5–15 mm. long, 2–7 mm. wide, subsessile, lance-oblong to ovate, entire or undulate-denticulate; raceme spiciform, strict, the lower flowers geminate, the upper often alternate; calyx 4–6 mm. high, the lobes lanceolate; corolla dull yellow with purplish guide lines, 10–12 mm. long, 3–5 mm. wide pressed, the upper lip erect, the lower reflexed; staminode glabrous.

Rocky canyons, Upper Sonoran Zone to Canadian Zone; Mono, Inyo, and Tulare Counties, California, and adjacent Nevada. Type locality: Little Olanche Mountain, California. June–Aug.

Penstemon Rothrockii subsp. *jacintensis* (Abrams) Keck, Madroño 3: 204. 1936. (*Penstemon jacintensis* Abrams, Bull. Torrey Club 33: 445. 1906; *P. Rothrockii* var. *jacintensis* Munz & Jtn. Bull. S. Calif. Acad. 23: 27. 1924.) Corolla 13–16 mm. long. Open forests, upper Transition Zone; San Jacinto Mountains, Riverside County, California, the type locality.

86. *Penstemon breviflorus* Lindl. Gaping Penstemon. Fig. 4723.

Penstemon breviflorus Lindl. Bot. Reg. 23: pl. 1946. 1837.

Penstemon carinatus Kell. Proc. Calif. Acad. 1: 63. 1855.

Penstemon canoso-barbatus Kell. op. cit. 2: 15. 1860.

Shrub 5–20 dm. high, the numerous virgate stems at length rather lax, glabrous and glaucous. Leaves 1–5 or 7 cm. long, 3–12 mm. wide, narrowly to widely lanceolate, subsessile, serrulate to entire, glabrous; thyrsus pyramidal, 1–5.5 dm. long, 4–15 cm. wide, many-flowered; calyx (like the pedicels) glandular-pubescent, 5–10 mm. high, the lobes broadly lanceolate to ovate; corolla white flushed with rose with prominent purplish guide lines, the buds yellowish, 15–18 mm. long, the arching galeate upper lip more than half the total length, its lobes less than 2 mm. long, the strongly reflexed lower lip parted almost to base into 3 oblong lobes, all glandular-pubescent externally and more or less strongly hirsute apically; staminode glabrous. $n = 8$.

Dry rocky slopes, Upper Sonoran and Transition Zones; in California through the Coast Ranges from Alameda County to Los Angeles County, thence north into the southern Sierra Nevada, occasional to the Lake Tahoe region. Type locality: California. May–July.

Penstemon breviflorus subsp. *glabrisépalus* Keck, Madroño 3: 207. 1936. Calyx glabrous, in other respects like the typical species. North Coast Ranges from Mendocino County to Napa County and the Sierra Nevada from Shasta County to Tulare County, California, east to Nevada in the Lake Tahoe region. Type locality: Mather, Tuolumne County, California.

87. *Penstemon Lemmonii* A. Gray. Bush Beard-tongue. Fig. 4724.

Penstemon Lemmonii A. Gray, Bot. Calif. 1: 557. 1876.

Open shrub 5–15 dm. high, the herbage bright green, at least the stems glaucous, glabrous up to the pedicels of the flowers. Leaves 1–6 cm. long, 5–25 mm. wide, ovate-lanceolate to elliptic, serrulate to subentire; thyrsus often narrow and less than 2 dm. long, but sometimes much more extensive with elongated divaricate lower branches again compound, viscid-pubescent; calyx 4–7 mm. high, the lobes lanceolate; corolla yellow with brownish galea and purple guide lines, 10–14 mm. long, the large limb widely gaping; staminode densely yellow-bearded, exserted. $n = 8$.

Brushy or wooded slopes, Transition Zones; California from Siskiyou County southward to Humboldt, Solano, and Eldorado Counties, extending slightly into Nevada. Type locality: Long Valley, Mendocino County, California. June–Aug.

88. *Penstemon antirrhinoides* Benth. Chaparral Beard-tongue. Fig. 4725.

Penstemon antirrhinoides Benth. in A. DC. Prod. 10: 594. 1846.

Lepidostemon penstemonoides Lemaire, Ill. Hort. 9: pl. 315. 1862.

Penstemon Lobbi Hort. ex Lemaire, loc. cit.

Shrub 1–2.5 m. high with spreading much-branched stems, more or less puberulent through-

out, only the flowers evidently viscid. Leaves 1–2 cm. long, 2–7 mm. wide, linear-elliptic to elliptic-ovate, mostly entire, firm, crowded; panicle broad, leafy; calyx 3–6 mm. high, the lobes ovate to rotund, obtuse or cuspidate-acute; corolla yellow tinged with brownish red, 16–20 mm. long, about 8–10 mm. broad at throat, the throat abruptly much dilated, the broad upper lip arching, the lower reflexed; staminode densely bearded with long yellow hairs, exserted.

Chaparral slopes, Upper Sonoran Zone; interior coastal drainage, San Bernardino County to San Diego County, California, south to Lower California. Type locality: California. April–May.

Penstemon antirrhinoides subsp. *microphyllus* (A. Gray) Keck. (*Penstemon microphyllus* A. Gray, Pacif. R. Rep. 4: 119. 1857; *P. Plummerae* Abrams, Bull. Torrey Club 33: 445. 1906; *P. antirrhinoides* var. *microphyllus* Munz & Jtn. Bull. Torrey Club 49: 43. 1922.) Herbage yellowish gray-green, canescent throughout, the twigs cinereous; calyx 5.5–8 or 10 mm. high, canescent and viscid, the lobes lance-oblong, acuminate. Desert ranges, Lower Sonoran Zone; Colorado Desert and southern and eastern Mojave Desert, California, to Arizona and northern Lower California. Type locality: "On Williams' Fork of the Colorado." April–June.

89. *Penstemon cordifolius* Benth. Heart-leaved Penstemon. Fig. 4726.

Penstemon cordifolius Benth. Scroph. Indicae 7. 1835.

Scandent shrub 1–3 m. high, the dark green herbage glabrous to puberulent, more densely hairy and moderately glandular within the inflorescence. Leaves 2–5 cm. long, 1–3 cm. wide, lance-ovate to cordate, remotely serrulate to sharply dentate, shiny, strongly veined; panicle pyramidal, compact, subsecund, drooping, hence the flowers resupinate and the peduncles often reflexed, leafy; calyx 7–10 mm. high; corolla dull scarlet, 30–40 mm. long, 5–7 mm. wide pressed, tubular, the upper lip galeate and the lower widely spreading; staminode densely bearded with long yellow-brown hairs, well included. $n = 8$.

Chaparral slopes, Upper Sonoran Zone; coastal mountains of southern California from San Luis Obispo County to the Mexican border. Type locality: "New California." May–July.

90. *Penstemon corymbosus* Benth. Redwood Penstemon. Fig. 4727.

Penstemon corymbosus Benth. in A. DC. Prod. 10: 593. 1846.

Penstemon intonsus Heller, Muhlenbergia 1: 44. 1904.

Penstemon corymbosus var. *puberulentus* Jepson, Man. Fl. Calif. 909. 1925.

Shrub 3–5 or more dm. high, the dark green herbage glabrous to canescent, the inflorescence densely glandular-pubescent. Leaves 1.5–4 cm. long, 6–17 mm. wide, narrowly to broadly elliptic, entire to remotely serrate, coriaceous, the margin narrowly revolute; corymb terminal, often many-flowered; calyx 6–10 mm. high, the lobes linear-lanceolate to lance-ovate; corolla brick red, 25–35 mm. long, 4–6 mm. wide pressed, narrowly tubular, the upper lip galeate, the lower spreading; staminode densely yellow-bearded, well included. $n = 8$.

Rocky slopes and cliffs, Transition Zones; Coast Ranges of California from Del Norte County to Monterey County, and Sierra Nevada foothills from Shasta County to Sutter County. Type locality: probably in the Santa Lucia Mountains, Monterey County. June–Oct.

91. *Penstemon ternatus* Torr. Blue-stemmed Penstemon. Fig. 4728.

Penstemon ternatus Torr. ex A. Gray, Bot. Mex. Bound. 115. 1859.

Straggly shrub 5–15 dm. high, the wand-like glaucous stems erect or sometimes scandent, the herbage glabrous throughout. Leaves in whorls of 3, or the lowermost opposite, 2–5 cm. long, 2–9 mm. wide, linear-lanceolate to broadly lanceolate, tapering to base and apex, remotely serrate-dentate, thickish, often folded along the midrib; panicle elongated, many-flowered; calyx 3–5 mm. high, the lobes lance-ovate, acuminate; corolla scarlet, 23–30 mm. long, 4–5 mm. wide pressed, narrowly tubular, glandular-puberulent, the upper lip galeate, the lower spreading; staminode densely yellow-bearded, well included. $n = 8$.

Chaparral slopes, Upper Sonoran and Transition Zones; San Gabriel and San Bernardino Mountains, southern California, to San Diego County and Lower California. Type locality: mountains east of San Diego. June–April.

Penstemon ternatus subsp. *septentrionalis* (Munz & Jtn.) Keck, Madroño 3: 216. 1936. (*Penstemon ternatus* var. *septentrionalis* Munz & Jtn. Bull. S. Calif. Acad. 23: 28. 1924.) Calyces and pedicels glandular-pubescent. Inland drainages in adjacent portions of Kern, Ventura, and Los Angeles Counties, California. Type locality: Oakgrove Canyon, Liebre Mountains.

10. SCROPHULARIA [Bauhin] L. Sp. Pl. 619. 1753.

Erect, strong-scented perennial herbs, with 4-angled stems bearing panicles of flowers. Leaves opposite, the blades toothed, petioled. Sepals 5, nearly distinct. Corolla greenish purple to dark maroon, its tube cylindric to semi-globose, its upper lip horizontally projecting and flat, its lower lip with the lateral lobes vertical and the middle deflexed or recurved. Stamens 4, slightly didynamous, included, the anther-cells divergent. Rudiment of uppermost filament scale-like or lacking. Capsule septicidal. Seeds numerous, plump, furrowed. [Named for its repute in curing scrofula.]

A genus of about 120 species, natives of the northern hemisphere. Type species: *Scrophularia nodosa* L.

Inflorescence villous, the hairs tipped with small glands; sepals acute to acuminate; corolla 8–10 mm. long; sterile filament lacking or a minute rudiment; capsule very acute. 1. *S. villosa*.

Inflorescence puberulent or short-pubescent, the hairs tipped with relatively large glands; sepals usually rounded (varying to acuminate in *S. californica*); sterile filament developed.

Corolla dark maroon, 9–11 mm. long, its upper half blackish, the tube globular-urceolate with constricted orifice, the lowermost lobe deflexed-spreading; sterile filament lance-oblong, blackish maroon; capsule obtuse or merely acute. 2. *S. atrata*.

Corolla paler, the tube globular-cylindric to cylindric with less constricted orifice, the lowermost lobe recurved; sterile filament paler; capsule acute to acuminate.

Sterile filament clavate to obovate, longer than wide, usually brown (but sometimes green in *S. multiflora*); capsule acute or shortly acuminate; inflorescence relatively lax.

Sepals oblong to ovate, acuminate to obtuse or (usually erosely) rounded; corolla 8–15 mm. long, the upper lobes nearly the length of the tube; capsule 6–8 mm. long, ovoid-conic; leaf-blades simply to doubly dentate with acute or blunted teeth, the larger blades cordate at base.

3. *S. californica*.

Sepals circular (or nearly so), broadly rounded; corolla 5–8 mm. long, the upper lobes shorter than the tube; capsule 4–6 mm. long, globose-conic; leaf-blades sharply toothed or incised, truncate to slightly cordate at base.

4. *S. multiflora*.

Sterile filament flabellate, wider than long, yellowish green; corolla 9–14 mm. long; capsule sharply acuminate; inflorescence stricter and more elongated; leaf-blades simply to doubly dentate, truncate to slightly cordate at base.

5. *S. lanceolata*.

1. *Scrophularia villosa* Pennell. Santa Catalina Figwort. Fig. 4729.

Scrophularia villosa Pennell, Field Mus. Bot. Ser. 5: 223. 1923.

Scrophularia californica var. *catalina* Jepson, Man. Fl. Pl. Calif. 906. 1925.

Stem 12–18 dm. tall or more, glandular-pubescent, the inflorescence glandular-villose. Leaf-blades ovate, acuminate, sharply and somewhat doubly dentate, reaching 10–15 cm. long and 8–12 cm. wide, cordate to petioles 3–5 cm. long; panicle narrow, reaching 15–45 cm. long by 5–10 cm. wide, its branches widely spreading; sepals 3 mm. long, triangular-ovate, acute, glandular-villose; corolla 8–9 mm. long, deep maroon, the upper lobes blackish, the lowermost lobe slightly paler and deflexed; uppermost filament a minute awn-like rudiment or else lacking; capsule conic, 5–6 mm. long.

Canyon bottoms, Upper Sonoran Zone; Santa Catalina Island, southern California. Type locality: foot of Equestrian Trail, Santa Catalina Island, California. April–Sept.

2. *Scrophularia atrata* Pennell. Black-flowered Figwort. Fig. 4730.

Scrophularia atrata Pennell, Proc. Acad. Phila. 99: 172. 1947.

Stem 10–20 dm. tall, glandular-puberulent in inflorescence. Leaf-blades ovate, acute, dentate with rounded or broadly acute teeth, reaching 6–10 cm. long and 5–8 cm. wide, on petioles 2–7 cm. long; panicle elongated, of 10–15 fascicles or more, its branches divaricately spreading; sepals 3 mm. long, ovate or lance-ovate, rounded, narrowly erose-margined; corolla 9–11 mm. long, dark maroon, its upper half blackish, its tube globular-urceolate with constricted orifice, its lowermost lobe deflexed-spreading; uppermost filament lance-oblong, blackish maroon, much narrower than the neck of the upper corolla-lip; capsule 6–8 mm. long, ovoid, obtuse or acute.

Rocky limestone, Upper Sonoran Zone; along coast of Santa Barbara County, southern California. Type locality: Surf, California. May.

3. *Scrophularia californica* Cham. & Sch. Coast Figwort. Fig. 4731.

Scrophularia californica Cham. & Sch. Linnaea 2: 585. 1827.

Scrophularia oregana Pennell, Bull. Torrey Club. 55: 316. 1928.

Stem 10–15 dm. tall, finely glandular-pubescent, the inflorescence sparsely glandular-puberulent. Leaf-blades ovate or triangular-ovate, acute, simply or somewhat doubly dentate, reaching 9–11 cm. long and 6–8 cm. wide (or more), truncate or cordate to petioles 3–5 cm. long; panicle narrow, reaching 20–40 cm. long by 5–10 cm. wide, the branches ascending-spreading; sepals 3–4 mm. long, oblong to ovate, acuminate to obtuse (or slightly rounded); corolla 8–15 mm. long, dorsally garnet-brown to maroon, ventrally paler or yellowish, the lowermost lobe recurving; uppermost filament clavate to obovate, brown; capsule ovoid-conic, 6–8 mm. long.

Sandy soil, banks and openings in forest, Humid Transition Zone; Vancouver Island, British Columbia, to the Santa Monica Mountains, Los Angeles County, southern California. Type locality: San Francisco, California. Feb.–July.

4. *Scrophularia multiflora* Pennell. Many-flowered Figwort. Fig. 4732.

Scrophularia californica var. *floribunda* Greene, Man. Bay. Reg. 273. 1894.

Scrophularia floribunda Heller, Muhlenbergia 2: 246. 1906. Not *S. floribunda* Boiss. & Bal.

Scrophularia californica var. *laciniata* Jepson, Man. Fl. Pl. Calif. 906. 1925. Not *S. laciniata* Waldst. & Kit.

Scrophularia multiflora Pennell, Proc. Acad. Phila. 99: 173. 1947.

Stem 6–12 dm. tall, minutely glandular-pubescent, more strongly so in the inflorescence. Leaf-blades oblong-lanceolate to ovate, acute, doubly dentate to somewhat incised, reaching 4–15 cm. long and 3–10 cm. wide, truncate or cordate to petioles 2–6 cm. long; panicle relatively lax, reaching 30–50 cm. long by 5–10 cm. wide, the branches spreading; sepals 2–3 mm. long, nearly circular, rounded; corolla 5–7 mm. long, dorsally garnet-brown or reddish, ventrally pale or greenish yellow, the lowermost lobe recurving; uppermost filament clavate to obovate, brown or sometimes greenish; capsule globose-conic, 5–7 mm. long.

Sandy or rocky soil, usually over granite or andesite but also over limestone and basalt, chaparral and on desert mountains, Lower Sonoran Zone to Arid Transition Zone; nearly throughout California, and in western Nevada. Type locality: California. April–June.

5. *Scrophularia lanceolata* Pursh. Hare Figwort. Fig. 4733.

Scrophularia lanceolata Pursh, Fl. Amer. Sept. 419. 1814.

Scrophularia nodosa var. *occidentalis* Rydb. Contr. U.S. Nat. Herb. 3: 517. June 1896.

Scrophularia occidentalis Bickn. Bull. Torrey Club 23: 315. Aug. 1896.

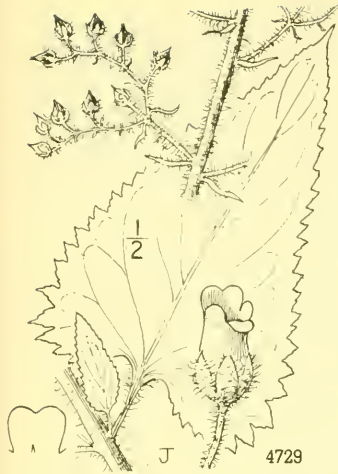
Stem 10–15 dm. tall, minutely glandular-pubescent or -puberulent. Leaf-blades lanceolate to



4723. *Penstemon brevisflorus*
4724. *Penstemon Lemmonii*

4725. *Penstemon antirrhinoides*
4726. *Penstemon cordifolius*

4727. *Penstemon corymbosus*
4728. *Penstemon ternatus*



4729



4730



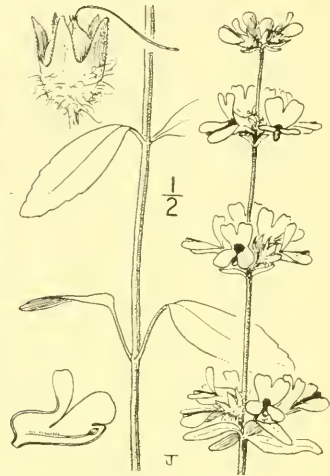
4731



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4729. *Scrophularia villosa*
 4730. *Scrophularia atrata*
 4731. *Scrophularia californica*

4732. *Scrophularia multiflora*
 4733. *Scrophularia lanceolata*
 4734. *Collinsia concolor*

4735. *Collinsia heterophylla*
 4736. *Collinsia austromontana*
 4737. *Collinsia multicolor*

ovate-lanceolate, acuminate, sharply simply or somewhat doubly dentate or proximally incised, reaching 9–12 cm. long and 4–6 cm. wide, truncate or slightly cordate to petioles 1–3 cm. long; panicle narrow, reaching 20–50 cm. long by 5–10 cm. wide, the branches ascending-spreading; sepals 3 mm. long, ovate, rounded; corolla 9–14 mm. long, dorsally light maroon, ventrally yellowish green, the lowermost lobe recurving; uppermost filament flabellate, wider than long, yellow-green; capsule ovoid-conic, 7–8 mm. long.

Moist thickets and stream banks, Upper Sonoran and Transition Zones; southern British Columbia to northern California, eastward across the northern United States to the Atlantic Ocean. Type locality: Pennsylvania. May–July.

11. COLLINSIA Nutt. Journ. Acad. Phila. 1: 190. 1817.

Erect annual herbs. Leaves opposite, dentate to entire, the upper sessile or clasping. Flowers solitary or fascicled, axillary to the upper sometimes reduced leaves. Sepals 5, united one-sixth to one-half length. Corolla cyanic, its tube sagittally flattened and gibbous at base on upper side, upper lip erect or ascending from an arched base, the lower lip with lateral lobes horizontally projecting, mostly hiding the concave lowermost lobe which contains the stamens and pistil. Stamens 4, included, slightly didynamous, the anther-cells divaricate. Capsule loculicidal, and the few seeds large and wingless. [Named in honor of Zaccheus Collins, an early American botanist.]

A genus of over 20 species, mostly of the western United States, but with two members in the Mississippi Valley. Type species, *Collinsia verna* Nutt.

Pedicels shorter than calyx (or longer in *C. multicolor*); inflorescence puberulent to hirsute, often some hairs gland-tipped; corolla 10–22 mm. long; calyx-lobes obtuse to acute.

Antero-lateral lobes of corolla glabrous, the upper corolla-lip not cross-barred; leaf-blades glabrous (except in *C. austromontana*); plants not strongly glandular.

Upper over half length of lower corolla-lip, its distal portion erect; capsule 3–5 mm. long; inflorescence moniliform, of 3–8 distinct fascicles; plants simple near base, often branched distally.

Corolla purple or violet (or the upper lip whitish), the lobes not strongly veined; calyx-lobes acute to obtuse; inflorescence somewhat glandular-pubescent; leaf-blades acutish to obtuse, dentate with appressed teeth to entire.

Lower pedicels shorter than to nearly equaling the length of the calyces; corolla strongly pouched at base, its profile rising vertically; leaf-blades crenate-dentate to nearly entire, truncately rounded at base.

Leaf-blades glabrous beneath; upper at least two-thirds length of lower lip of corolla.

Corolla 12–14 mm. long, its lips both violet, and its basal pouch less inflated; upper pair of filaments, like the lower, unspurred; calyx-lobes obtuse or obtusish; leaf-blades linear-lanceolate, crenate-dentate to nearly entire. 1. *C. concolor*.

Corolla 15–20 mm. long, its upper lip pale or white, the lower purple or violet-purple; upper filaments each basally with a sharp spur that projects upward into the enlarged nectar-pouch; calyx-lobes acute; leaf-blades lanceolate to oblong-lanceolate, crenate-dentate. 2. *C. heterophylla*.

Leaf-blades pubescent beneath; upper one-half to two-thirds the length of lower corolla-lip, the corolla 10–15 mm. long; upper filaments with short basal spurs; calyx-lobes obtuse to acutish. 3. *C. austromontana*.

Lower pedicels becoming much longer than the calyces; corolla 17–20 mm. long, the upper lip white, the lower violet, the tube only slightly pouched at base, its profile rounded; leaf-blades with low teeth, slightly cordate at base. 4. *C. multicolor*.

Corolla white or purplish tinged, the lobes strongly veined; calyx-lobes rounded; inflorescence with gland-tipped or often wholly glandless hairs; leaf-blades rounded, usually crenate-dentate. 5. *C. bartisiaefolia*.

Upper less than half length of lower corolla-lip, its upcurved apex brownish, the tube and upper lip violet, the laterals of the lower lip white, the corolla 15–18 mm. long; capsule 7 mm. long; inflorescence head-like, of 1 or 2 fascicles; plants diffusely branched from base. 6. *C. corymbosa*.

Antero-lateral lobes of corolla hairy, the upper corolla-lip less than half length of lower and with dark violet cross-bar, the corolla 13–17 mm. long, white or yellowish white but distally lined or spotted with purple; leaf-blades pubescent beneath; plants strongly glandular (staining papers). 7. *C. tinctoria*.

Pedicels longer than calyx; inflorescence glandular-pubescent to glabrous; corolla 5–19 mm. long.

Inflorescence not glandular-pubescent or, if rarely glandular, the minute glands scarcely wider than their supporting hairs; calyx-lobes exceeding the capsule; seeds several to a cell (usually 3 or more).

Calyx-lobes obtuse or obtusish; corolla 6–9 mm. long; upper filaments somewhat hairy, the lower glabrous. 8. *C. Parryi*.

Calyx-lobes acute to attenuate.

Upper and lower filaments both glabrous; lowermost corolla-lobe externally glabrous, distally long-upcurving; seeds turgid, not winged; calyx-lobes attenuate to somewhat aristate tips; stem grayish-puberulent.

Corolla 12–19 mm. long, the antero-lateral lobes obovate-spatulate and about equaling the mid-anterior lobe, the upper lip erect-spreading or somewhat reflexed; stems relatively stout, erect. 9. *C. grandiflora*.

Corolla 5–10 mm. long, the antero-lateral lobes oblanceolate to narrowly obovate-spatulate and exceeding the mid-anterior lobe, the upper lip upcurved; stems more slender, laxly ascending. 10. *C. parviflora*.

Upper filaments hairy, the lower glabrous; lowermost corolla-lobe externally bearded or glabrous, distally abruptly upcurved near apex; seeds sharply edged or winged; calyx-lobes lanceolate, acute; stem grayish-puberulent to usually glabrate.

Seeds 2 mm. wide, relatively turgid, narrowly or not winged; capsule 3–4(–5) mm. long; corolla 5–6 mm. long, the lowermost lobe externally glabrous or slightly hairy. 11. *C. solitaria*.

Seeds 3–5 mm. wide, strongly compressed and circularly winged; capsule 5–6 mm. long; corolla 6–16 mm. long, the lowermost lobe externally hairy.

Basal pouch slightly inflated, the upper proximal side of the corolla-tube rounded and forming a low angle with calyx; corolla less than one and a half times calyx, its upper lip usually ascending. 12. *C. Bruceae*.

Basal pouch moderately to strongly inflated, the upper proximal side of the corolla-tube

strongly curved, forming an angle of over 50° with calyx; corolla 2-3 times length of calyx, its upper lip erect-spreading. 13. *C. sparsiflora*.

Inflorescence glandular-pubescent; calyx-lobes obtuse-rounded to acute, little or no longer than the capsule; seeds few to a cell.

Capsule 5-6 mm. long, globose-ovoid, the seeds usually 3 to a cell; calyx-lobes ovate, equaling the tube; bracts and upper leaf-blades rounded to base, the blades nearly oblong. 14. *C. callosa*.

Capsule 2.5-4(-5) mm. long, ovoid or obovoid, the seed usually 1 to a cell (1-3 in *C. Rattanii*); calyx-lobes lanceolate to oblong-lanceolate, longer than the tube; bracts and leaf-blades narrowed to base.

Fruiting pedicels ascending-spreading or ascending; upper bracts gradually smaller than lower, rarely less than half as long as pedicels.

Corolla pale violet or whitish, violet-lined, the upper lip ascending and longer than the lower; calyx-lobes exceeding the capsule; leaf-blades and lower bracts oblong or oblanceolate. 15. *C. Childii*.

Corolla violet or purple, less strongly or not lined, the upper lip strongly upcurved but shorter than the lower; calyx-lobes about equaling or shorter than the capsule.

Upper corolla-lip dark violet, at base with lateral ridges that project as knobs over orifice, the lower lip with lowermost as long as the lateral lobes; corolla-throat one and a half to twice as long as wide. 16. *C. Greenei*.

Upper corolla-lip paler, yellowish white, at base obscurely or not ridged or knobbed, the lower lip with lowermost shorter than the lateral lobes; corolla-throat no longer than wide. 17. *C. Rattanii*.

Fruiting pedicels deflexed-spreading; upper lip of corolla white, the lower blue-violet; upper bracts abruptly smaller than lower, subulate, less than a third as long as the pedicels.

Corolla 6-9 mm. long, the lower lip with lowermost shorter than to usually about equaling the lateral lobes; capsule usually wider than long. 18. *C. Torreya*.

Corolla 4-5 mm. long, the lower lip with lowermost one-half to two-thirds length of lateral lobes; capsule no wider than long. 19. *C. Wrightii*.

1. *Collinsia concolor* Greene. Southern Chinese Houses. Fig. 4734.

Collinsia concolor Greene, *Erythra* 3: 49. 1895.

Collinsia bicolor var. *concolor* Jepson, *Man. Fl. Pl. Calif.* 902. 1925.

Plant 3-6 dm. tall, the stem canescent-puberulent or distally minutely glandular. Leaf-blades lanceolate, obtuse, crenate-dentate to entire, glabrous, 2-5 cm. long, rounded to nearly sessile bases; inflorescence of clusters of short-pedicelled flowers, its lowest bracts foliose, the middle and upper reduced and linear, each equaled or exceeded by its fascicle of 3-5 flowers; calyx-tube villose, 2-3 mm. long, the oblong-ovate minutely pubescent lobes 3-4 mm. long; corolla 10-14 mm. long, basal pouch rounded; upper lip violet, but proximally white with small maroon spots; lower lip slightly larger, its lateral lobes violet and loosely pilose on upper surface, its lowermost lobe shorter and distally villose over exposed lower surface; filaments all simple; capsule 4 mm. long; seeds 1.5 mm. long, slightly incurved.

Thin granitic soil, Upper Sonoran Zone; coastal mountains from San Bernardino County, southern California, south to northern Lower California. Type locality: San Diego County, California. April-June.

2. *Collinsia heterophylla* Buist. Purple-and-white Chinese Houses. Fig. 4735.

Collinsia bicolor Benth. *Trans. Hort. Soc. Lond.* II. 1: 480. 1835. Not *C. bicolor* Raf.

Collinsia heterophylla Buist ex R. Graham, *Bot. Mag.* 65: pl. 3695. 1838.

Collinsia hernandezii Elmer, *Bot. Gaz.* 41: 310. 1906.

Plant 3-6 dm. tall, the stem slightly puberulent or distally finely glandular-pubescent. Leaf-blades lanceolate, obtuse or obtusish, dentate to nearly entire, glabrous, reaching 3-6 cm. long, rounded to short ciliate petioles; inflorescence of clusters of short-pedicelled flowers, its lowest bracts foliose, the middle and upper reduced and linear, each equalled or exceeded by its fascicle of 1, or usually 2, flowers; calyx-tube pubescent to villose, 2 mm. long, the lanceolate finely pubescent lobes 5-6 mm. long; corolla 15-20 mm. long, basal pouch raised and obtusely rounded; upper lip white or pale bluish, but proximally with many small maroon dots; lower lip slightly larger, its lateral lobes purple and its lowermost lobe much shorter, paler, and glabrous; upper pair of filaments each bearing at base an erect awn-like process that projects upward into the nectar-pouch; capsule 5 mm. long; seeds 2 mm. long, incurved, round and caplike.

Sandy or stony soil, Lower and Upper Sonoran, or on the coast Humid Transition Zone; from Mendocino and Butte Counties, northern California, south to northern Lower California. Type locality: mistakenly supposed to be from the Columbia River. March-June.

3. *Collinsia austromontana* (Newsom) Pennell. Downy-leaved Chinese Houses. Fig. 4736.

Collinsia bicolor var. *austromontana* Newsom, *Bot. Gaz.* 87: 277. 1929.

Plant 2-3 dm. tall, the stem finely canescent-puberulent or distally glandular-pubescent. Leaf-blades oblong-lanceolate, obtuse, crenate-dentate, pale and finely pubescent beneath, reaching 3-3.5 cm. long, rounded to short ciliate petioles; inflorescence of clusters of short-pedicelled flowers, its lowest bracts foliose, the middle and upper reduced and narrowly oblong, each equalled or exceeded by its subtended fascicle of usually 2 flowers; calyx-tube pubescent to villose, 2-3 mm. long, the oblong finely pubescent lobes 4-5 mm. long; corolla 12-14 mm. long, basal pouch rounded; upper lip much shorter than the lower which has widely oblanceolate lateral lobes and its lowermost lobe glabrous and the shortest; upper filaments with basal spurs 1 mm. or less long.

In chaparral, Upper Sonoran Zone; San Gabriel and San Bernardino Mountains, southern California. Type locality: Brown's Flats, San Gabriel Mountains, Los Angeles County, California. May-July.

4. *Collinsia multicolor* Lindl. & Paxt. Franciscan Blue-eyed Mary. Fig. 4737.

Collinsia multicolor Lindl. & Paxt. Flow. Gard. 2: 89. pl. 55. 1851.

Collinsia franciscana Bioletti, Erythra 1: 17. 1893.

Collinsia sparsiflora var. *franciscana* Jepson, Fl. W. Mid. Calif. 399. 1901.

Plant 1.5–3 dm. tall, the stem distally canescent-puberulent and the inflorescence with long gland-tipped hairs. Leaf-blades lanceolate or triangularly ovate-lanceolate, acutish to obtuse, dentate, glabrous, reaching 2–3 cm. long, rounded to nearly sessile bases; inflorescence of slender-pedicelled flowers, the bracts all foliose but the upper smaller, the pedicels solitary and 10–27 mm. long; calyx-tube puberulent, 3 mm. long, the ovate-lanceolate ciliate lobes 5 mm. long; corolla 18–20 mm. long, basal pouch rounded; upper lip whitish, much shorter than the lower lip, of which the obovate lateral lobes are violet-blue but the slightly shorter lowermost lobe is distally purple and glabrous; filaments all simple; capsule 5 mm. long; seeds 1.5 mm. long, with incurved margins.

Barren soil, Upper Sonoran and Transition Zones; near the coast from San Francisco to Monterey Counties; middle California. Type locality: California. April–May.

5. *Collinsia bartsiaefolia* Benth. White Chinese Houses. Fig. 4738.

Collinsia bartsiaefolia Benth. in A. DC. Prod. 10: 318. 1846.

Collinsia stricta Greene, Pittonia 2: 23. 1889.

Collinsia tinctoria var. *stricta* Jepson, Man. Fl. Pl. Calif. 903. 1925.

Collinsia bartsiaefolia var. *stricta* Newsom, Bot. Gaz. 87: 273. 1929.

Plant 2–4 dm. tall, the stem canescent-puberulent or distally minutely glandular-pubescent. Leaf-blades oblong, obtuse, dentate with rounded or acutish teeth, glabrous, 2–4 cm. long, rounded to short ciliate petioles; inflorescence of clusters of short-pedicelled flowers, the bracts reduced and linear-oblong, each exceeded by its fascicle of 1 or 2 flowers; calyx-tube villose to glabrous, 2 mm. long, the oblong obtuse pubescent or glabrous lobes 3 mm. long; corolla 10–14 mm. long, basal pouch rounded, scarcely raised; upper lip white, much shorter than the lower lip, of which the obovate lateral lobes are white or purple, with the lowermost lobe shorter and glabrous, all the lobes venose-lined; filaments all simple; capsule 3.5 mm. long.

Presumably sandy soil, Lower and Upper Sonoran Zones; from Shasta and Lake Counties to Kern County, California. Type locality: Mokelumne River, Calaveras County, California. April–May.

Collinsia bartsiaefolia var. *Davidsonii* (Parish) Newsom, Bot. Gaz. 87: 272. 1929. (*Collinsia Davidsonii* Parish, Zoe 4: 147. 1893.) Leaf-blades relatively wider, oblong-ovate, crenate-dentate; stem only 0.5–2 dm. tall, not glandular. Lower Sonoran Zone; Mojave Desert of southern California. Type locality: Lancaster, Los Angeles County, California. April–May.

Collinsia bartsiaefolia var. *hirsuta* (Kell.) Pennell. (*Collinsia hirsuta* Kell. Proc. Calif. Acad. 2: 110. fig. 34. 1863.) Leaf-blades widely oblong, dentate with rounded lobes; inflorescence usually not glandular and of fewer (3 to 5, instead of 4 to 9) fascicles, the corolla 16–19 mm. long. Sandy soil, Lower and Upper Sonoran Zones; San Francisco and Madera Counties to Monterey and Kern Counties, central California. Type locality: San Francisco, California. March–May.

6. *Collinsia corymbosa* Herder. Round-headed Chinese Houses. Fig. 4739.

Collinsia corymbosa Herder, Ind. Sem. Hort. Petrop. 32. 1857.

Plant 1–1.5 dm. tall, usually with diffusely spreading branches, the stem canescent-puberulent throughout. Leaf-blades oblong, rounded at apex, crenate-dentate, finely pilose, 2–3 cm. long, rounded or cuneate to short petioles or the upper nearly sessile; inflorescence of single head-like clusters of flowers, the foliose bracts much exceeded by their fascicles of 3 or 4 flowers, which are borne on pedicels 3–7 mm. long; calyx-tube pubescent to somewhat villose, 5 mm. long, the ovate rounded glabrescent lobes 5 mm. long; corolla 15–18 mm. long, basal pouch low-rounded and scarcely evident; upper lip purple-violet (its free lobes brownish), less than half length of lower lip, of which the white lateral lobes about equal the violet-purple glabrous lowermost lobe; filaments all simple; capsule 7 mm. long; seeds 2 mm. long, turgid, with incurved margins.

Sand dunes, Humid Transition Zone; coast from Mendocino County to San Francisco County, California. Type locality: accredited to "Mexico," but presumably from Russian colony on coast of present Sonoma County, California. May–June.

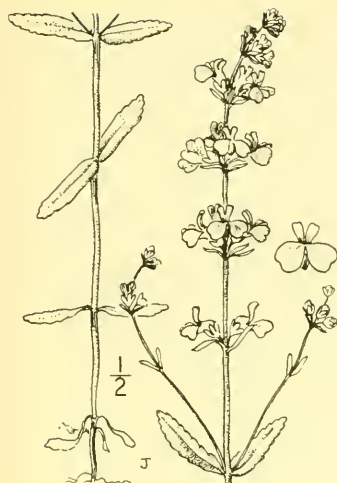
7. *Collinsia tinctoria* Hartw. Sticky Chinese Houses. Fig. 4740.

Collinsia tinctoria Hartw. ex Benth. Pl. Hartw. 328. 1849.

Collinsia barbata Bosse, Verh. Ver. Beford. Gartenb. II. 1: 399. 1853.

Collinsia septemnervia Kell. Proc. Calif. Acad. 2: 224. 1863.

Plant 3–6 dm. tall, the stem proximally glabrous, distally pubescent with spreading glandless hairs but through the inflorescence pubescent with short hairs bearing large dark glands. Leaf-blades lanceolate, obtuse, serrate-dentate, beneath finely pubescent, reaching 5–9 cm. long, mostly rounded to sessile bases (upper somewhat clasping and lowest smaller and petioled); inflorescence of clusters of short-pedicelled flowers, the reduced bracts glandular-pubescent, each exceeded by its fascicle of 3 to 5 flowers; calyx 5–6 mm. long, glandular-pubescent, its oblong-lanceolate acutish sepals united less than 1 mm.; corolla 13–17 mm. long, basal pouch strongly raised and sharply rounded; upper lip white, proximally with pansy-violet cross-band and at base with white knob-like protuberance over orifice; lower lip over twice length of upper, its lateral lobes white and villose-pubescent, proximally violet-lined and distally violet-dotted,



4738



4739



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4743



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4746

4738. *Collinsia bartsiaefolia*
 4739. *Collinsia corymbosa*
 4740. *Collinsia tinctoria*

4741. *Collinsia Parryi*
 4742. *Collinsia grandiflora*
 4743. *Collinsia parviflora*

4744. *Collinsia solitaria*
 4745. *Collinsia Bruceae*
 4746. *Collinsia sparsiflora*

about equaling the less pubescent glandular-dotted lowermost lobe; filaments all simple; capsule 5 mm. long; seeds 3 mm. long, with recurved margins.

Stony places, over granitic, calcareous, or serpentine rock, Upper Sonoran Zone; Shasta County to Sonoma and Fresno Counties, California. Type locality: "Sacramento mountains," California. May-Aug.

8. *Collinsia Párryi* A. Gray. Parry's Blue-eyed Mary. Fig. 4741.

Collinsia Parryi A. Gray, Syn. Fl. N. Amer. 2: 257. 1878.

Collinsia cahanis M. E. Jones, Contr. West. Bot. No. 12: 68. 1908.

Plant 3-6 dm. tall, the stem and pedicels minutely canescent-puberulent. Leaf-blades lanceolate, obtuse, entire, glabrous, 1.5-4 cm. long, rounded to nearly sessile bases; inflorescence lax, the bracts sometimes ternate, foliose but the upper much smaller, each subtending 1 or 2 flowers, the pedicels of which become 10-40 mm. long; calyx 4-6 mm. long, slightly canescent-puberulent, its oblong-lanceolate obtuse or obtusish sepals united one-third their length; corolla 8-9 mm. long, glabrous, basal pouch low-rounded; both lips violet-blue, the upper somewhat shorter, the lower with lateral lobes slightly exceeding the lowermost lobes; capsule 5 mm. long; seeds 1 mm. long, with slightly decurved margins.

Brushy slopes, Upper Sonoran Zone; San Gabriel and San Bernardino Mountains of southern California. Type locality: San Bernardino County, California. March-May.

9. *Collinsia grandiflora* Dougl. Large-flowered Blue-eyed Mary. Fig. 4742.

Antirrhinum tenellum Pursh, Fl. Amer. Sept. 421. 1814.

Linaria tenella F. G. Dietr. Vollst. Lexik. Gaertn. Nachtr. 4: 408. 1818.

Collinsia grandiflora Dougl. ex Lindl. Bot. Reg. 13: pl. 1107. 1827.

Collinsia multiflora Howell, Fl. N.W. Amer. 506. 1901.

Collinsia tenella Piper, Contr. U.S. Nat. Herb. 11: 496. 1906. Not *C. tenella* Benth. 1846.

Plant 1-4 dm. tall, the stem and pedicels minutely canescent-puberulent (or stem distally slightly glandular-pubescent). Leaf-blades oblong to narrowly elliptic, obtuse, crenately dentate to entire, glabrous, 2.5-4 cm. long, cuneately narrowed to sessile bases (but the lowest much shorter and petioled); inflorescence lax, the bracts somewhat reduced, each subtending 2 to 5 flowers, the pedicels of which become 8-20 mm. long; calyx 6 mm. long, glabrous, its lanceolate-attenuate sepals united one-third their length; corolla 12-19 mm. long, glabrous throughout, basal pouch low, sharply rounded; upper lip pale or white, with widespread lobes; lower lip longer, its lateral lobes deep violet-blue and distally rounded, almost equaling the paler lowermost lobe; capsule 3 mm. long; seeds 1.5 mm. long, oval, with decurved margins.

Rocky or grassy moist places, Humid Transition Zone; Vancouver Island to western California, passing through the Cascade Range only along the Columbia River. Type locality: Columbia River. April-May.

10. *Collinsia parviflora* Dougl. Small-flowered Blue-eyed Mary. Fig. 4743.

Collinsia parviflora Dougl. ex Lindl. Bot. Reg. 13: pl. 1082. 1827.

Collinsia grandiflora var. *pusilla* A. Gray, Syn. Fl. N. Amer. 2: 256. 1878.

Collinsia breviflora Suksd. W. Amer. Sci. 12: 54. (August) 1901.

Collinsia pusilla Howell, Fl. N.W. Amer. 506. (November) 1901.

Plant 0.5-4 dm. tall, the stem and pedicels minutely canescent-puberulent. Leaf-blades oblong-lanceolate, obtuse, crenately dentate to usually entire, glabrous, 2.5-3.5 cm. long, cuneately narrowed to sessile bases (the bracts sometimes ternate or quaternate); inflorescence lax, the bracts scarcely reduced, each subtending 1 or 2 flowers, the pedicels of which become 5-25 mm. long; calyx 6-7.5 mm. long, glabrous, its lanceolate-attenuate sepals united two-fifths their length; corolla 4-8 mm. long, glabrous throughout, basal pouch low, rounded; upper lip white, or distally violet-blue; lower lip longer, its oblanceolate or oblanceolate-spatulate lateral lobes distally violet-blue, about as long as the paler lowermost lobe; capsule 4 mm. long; seeds 2 mm. long, oval, turgid, with decurved margins.

Moist sandy, gravelly, or rocky soil, Transition and Canadian Zones; British Columbia to southern California, east to western Ontario, Michigan, and Colorado. Type locality: Columbia River Valley. April-July.

Collinsia parviflora var. *Diehlii* (M. E. Jones) Pennell. (*C. Diehlii* M. E. Jones, Contr. West. Bot. No. 12: 68. 1908.) Larger-flowered, the corolla 9-10 mm. long, with obovate antero-lateral lobes, and the calyx lobes 5-6 mm. long. Moist gravelly soil, Transition Zone; western Washington and Oregon. Type locality: Oregon City, Oregon. April-May. (Presumably hybrid of *C. grandiflora* × *C. parviflora*.)

11. *Collinsia solitaria* Kell. Remote-flowered Blue-eyed Mary. Fig. 4744.

Collinsia solitaria Kell. Proc. Calif. Acad. 2: 10. 1863.

Collinsia divaricata Kell. op. cit. 3: 36. 1863.

Collinsia parviflora var. *collina* Jepson, Man. Fl. Pl. Calif. 904. 1925.

Collinsia sparsiflora var. *solitaria* Newsom, Bot. Gaz. 87: 285. 1929.

Collinsia sparsiflora var. *collina* Newsom, op. cit. 286.

Plant 0.5-2.5 dm. tall, the stem minutely pubescent to glabrous, the pedicels glabrous. Leaf-blades narrowly oblong to nearly linear, obtuse or obtusish, glabrous, the upper narrow, entire and sessile, 1-2 cm. long, the lower crenately dentate, much shorter and petioled; inflorescence lax, the bracts not or scarcely reduced, each subtending a single flower (and usually but one flower of a pair developed), the pedicels becoming 10-25 mm. long; calyx 5-6 mm. long, glabrous, the sepals united 1.5-2 mm. long, their free portions lanceolate, acute; corolla 6-7 mm. long, basal pouch low, with the tube broadly rounded dorsally; both lips violet-purple, the upper more violet and with 2 red spots, the lower slightly longer, its purple lateral lobes slightly

exceeding the glabrous or pubescent lowermost lobe; capsule 4–5 mm. long; seeds 1.5–2 mm. wide, nearly circular, flattened, with decurved margins.

Grassy openings among conifers, Upper Sonoran and Transition Zones; Lake and Eldorado Counties to Fresno and San Luis Obispo Counties, central California. Type locality: near Oakland, California. March–June.

12. *Collinsia Bruceae* M. E. Jones. Mrs. Bruce's Blue-eyed Mary. Fig. 4745.

Collinsia Bruceae ("Bruceae") M. E. Jones, Contr. West. Bot. No. 12: 69. 1908.

Collinsia sparsiflora var. *Brucae* Newsom, Bot. Gaz. 87: 285. 1929.

Plant 0.5–2 dm. tall, the stem glabrous or distally minutely pubescent. Leaf-blades glabrous (or minutely pubescent on upper surface), the upper narrowly oblong-lanceolate, entire or crenate-dentate, 1–2.5 cm. long, sessile or shortly petioled, the lower much shorter and wider, more deeply dentate, on petioles that may be as long as the blades; inflorescence lax, the bracts not or scarcely reduced, each subtending a single flower (one or both of a pair developed), the pedicels becoming 10–20 mm. long; calyx 9–12 mm. long, glabrous, the sepals united 2–3 mm., their free portions lanceolate, acute; corolla 7–10 mm. long; basal pouch low with the tube broadly rounded dorsally; both lips lavender or white, the upper one proximally yellow with purple spots, the lower slightly longer, its lateral lobes somewhat exceeding the purple-spotted and distally hirsute lowermost lobe; capsule 5–6 mm. long; seeds 3–4 mm. wide, nearly circular, flattened, with decurved margins.

Usually rocky partly wooded grassland, Upper Sonoran Zone; southern Washington to central California. Type locality: Little Chico, Butte County, California. March–May.

13. *Collinsia sparsiflora* Fisch. & Mey. Few-flowered Blue-eyed Mary. Fig. 4746.

Collinsia sparsiflora Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 33. 1836.

Collinsia parviflora var. *sparsiflora* Benth. in A. DC. Prod. 10: 319. 1846.

Plant 0.5–2.5 dm. tall, the stem and pedicels minutely pubescent to glabrous. Leaf-blades glabrous (or pubescent on upper surface), the upper narrowly oblong, crenate-dentate to entire, 1–3 cm. long, sessile, the lower much shorter, more lobed, and longer-petioled; inflorescence lax, the bracts not or scarcely reduced, each subtending a single flower (one or both of a pair developed), the pedicels becoming 10–30 mm. long; calyx 6–7 mm. long, glabrous, the sepals united 2 mm., their free portions lanceolate, acute; corolla 8–13 mm. long, the basal pouch moderate, raised so that dorsal side makes angle of 50° to 80° with calyx, both lips purple, the upper proximally white with dark purple dots, the lower longer, its somewhat spreading lateral lobes exceeding the hirsute lowermost lobe; capsule 5–6 mm. long; seeds 2.5–3 mm. wide, nearly circular, flattened, with decurved margins.

Grassy places, on various rock formations including serpentine, Upper Sonoran and Transition Zones; Butte County to Marin and Tuolumne Counties, California. Type locality: near Ruthenian colony at the present Fort Ross, Sonoma County, California. March–May.

Collinsia sparsiflora var. *arvensis* (Greene) Jepson, Fl. W. Mid. Calif. 398. 1901. (*Collinsia arvensis* Greene, Pittonia 2: 232. 1892.) Flowers larger, the corolla 13–16 mm. long, its basal pouch so strongly inflated that its dorsal side makes an angle of 80° to 90° with the calyx. Rocky usually grassy places, Upper Sonoran and Transition Zones; Mendocino and Lake Counties to Sonoma County, central California. Type locality: Knight's Valley, Sonoma County. March–May.

14. *Collinsia callosa* Parish. Large-fruited Blue-eyed Mary. Fig. 4747.

Collinsia callosa Parish, Erythra 7: 96. 1899.

Plant 0.5–2 dm. tall, the stem distally as well as the pedicels and calyces pilose with short hairs bearing large dark glands. Leaf-blades glabrous, oblong to oblong-lanceolate, obtuse, entire or nearly so, 1–2.5 cm. long, sessile or slightly petioled; inflorescence lax, the bracts not or scarcely reduced, each subtending a single flower, the pedicels becoming 4–15 mm. long; calyx 4–6 mm. long, the sepals united half their length, their free portions ovate-lanceolate, acute to acuminate; corolla 8–9 mm. long, glabrous throughout, basal pouch low-rounded, both lips violet-purple, the upper one proximally white with fine purple dots, distally erect, the lower about as long, its lateral lobes exceeding the lowermost lobe; capsule 6 mm. long; seeds usually 3 to a cell, 2 mm. long, narrow, turgid.

Granitic sand, Upper Sonoran Zone; desert mountains, from Panamint Mountains of Inyo County to San Antonio Mountains of Los Angeles County, southern California. Type locality: Swarthout Canyon, San Antonio Mountains. April–May.

15. *Collinsia Childii* Parry. Child's Blue-eyed Mary. Fig. 4748.

Collinsia Childii Parry ex A. Gray, Syn. Fl. N. Amer. 2: 257. 1878.

Collinsia inconspicua Congdon, Erythra 7: 187. 1900.

Collinsia breviflora Suksd. W. Amer. Sci. 12: 54. 1901.

Plant 1.5–4 dm. tall, the stem distally and pedicels glandular-pubescent, with the older growth finely pubescent but glandless. Leaf-blades glabrescent, oblong-lanceolate, acutish to obtuse, denticulate to nearly entire, 2–4 cm. long, narrowed to short-petioled bases; inflorescence lax, the upper bracts much-reduced, each subtending 1–3 flowers (or else some bracts ternate or quaternate), the pedicels becoming 3–25 mm. long; calyx 5–7 mm. long, finely glandular-pubescent on ribs, the sepals united 2–3 mm., their free portions lanceolate, obtuse or obtusish; corolla 6–7 mm. long, glabrous throughout, the basal pouch low-rounded and hardly evident,

both lips pale violet or whitish, violet-lined, the upper merely ascending and as long as or slightly longer than the lower lip, of which the lateral lobes exceed the hyaline lowermost lobe; capsule 4 mm. long; seeds solitary in each cell, 3 mm. long, oval, turgid, with somewhat recurved margins.

Stony granitic soil, pine and oak forests, Upper Sonoran and Transition Zones; mountains, from Mariposa and Monterey Counties to San Diego County, California. Type locality: San Bernardino Mountains, California. April-June.

16. *Collinsia Greenei* A. Gray. Greene's Blue-eyed Mary. Fig. 4749.

Collinsia Greenei A. Gray, Proc. Amer. Acad. 10: 75. 1874.

Plant 1-3 dm. tall, the stem and leaves finely canescent with glandless hairs and also distally pilose with gland-tipped hairs. Leaf-blades oblong-lanceolate, obtuse, crenate-dentate to entire, 0.7-3 cm. long, narrowed to sessile bases, the lower petioled; inflorescence lax, the linear bracts shorter than their subtended fascicles of 1 to 4 flowers, the spreading pedicels becoming 3-10 mm. long; calyx 5 mm. long, minutely canescent-pubescent and also glandular-pilose, the sepals united 1.5 mm., their free portions lanceolate, obtuse or obtusish; corolla 10-12 mm. long, glabrous throughout, the basal pouch rounded and both lips dark violet, the upper more purple, erect-spreading, the lower lip longer, its lateral lobes about equaling the lowermost lobe; capsule 4 mm. long; seeds usually 2 to a cell, 2.5 mm. long, circular-oval, somewhat flattened, with recurved margins.

Rocky soil, Upper Sonoran and Transition Zones; northern coastal mountains, from Trinity County to Sonoma County, California. Type locality: Lake County, California. Spring.

17. *Collinsia Rattánii* A. Gray. Rattan's Blue-eyed Mary. Fig. 4750.

Collinsia Rattánii A. Gray, Proc. Amer. Acad. 15: 50. 1879.

Collinsia Torreyi var. *Rattánii* Jepson, Man. Fl. Calif. 905. 1925.

Plant 1.5-3.5 dm. tall, the stems, pedicels, and calyces minutely grayish-pubescent and also distally sparsely glandular-pilose. Leaf-blades widely linear to linear-lanceolate, obtuse, entire and somewhat revolute, 2-3 cm. long, sessile, the lower much shorter, crenate-dentate, and narrowed to petioles as long as the oval blades; inflorescence lax, the linear bracts gradually reduced on upper nodes, each subtending 1 or 2 flowers, their pedicels 5-10 mm. long; calyx 5-8 mm. long, glabrous, the sepals united 1-2 mm., their free portions lanceolate, acute or acutish; corolla 5-8 mm. long, glabrous throughout, the basal pouch raised and rather sharply rounded, upper lip white or lavender-violet, proximally medianly yellow and violet-lined, distally upcurved-reflexed, lower lip longer, decurved, purple-violet, its lateral lobes about equaling the lowermost lobe; capsule 3-4 mm. long; seeds 1-3 in each cell, 1.5-2 mm. long, oblong, turgid.

Open pine forest, Humid Transition Zone; coastal mountains, from Douglas County, Oregon, to Mendocino County, California. Type locality: ridge south of Trinity River, northwestern California. April-June.

Collinsia Rattánii subsp. *glandulosa* (Howell) Pennell. (*Collinsia glandulosa* Howell, Fl. N.W. Amer. 506. 1901.) Stoutier and less branched, the stem 3-5 dm. tall, the branches more ascending, and the capsules 4-5 mm. long. Open pine forest, Upper Sonoran and Transition Zones; Columbia River Valley of southern Washington and northern Oregon, from the Willamette Valley to the John Day River Valley. Type locality: Cold Camp, John Day Valley, Oregon. April-June.

Collinsia Rattánii var. *linearis* (A. Gray) Newson, Bot. Gaz. 87: 295. 1929. (*Collinsia linearis* A. Gray, Proc. Amer. Acad. 15: 50. 1879; *C. Torreyi* var. *linearis* Jepson, Man. Fl. Calif. 905. 1925.) Stem 2-4 dm. tall, relatively stout; corolla larger, 8-12 mm. long, its upper lip erect and its lower projecting (instead of tending, as in other components of species, to bring the limb of the corolla into a single oblique plane); capsule 4 mm. long. Gravelly or stony open or partially shaded places, often on serpentine. Transition Zone; Klamath mountain system of southern Oregon south to Trinity County, northern California. Type locality: Klamath and Trinity Rivers, northwestern California. April-July.

18. *Collinsia Torreyi* A. Gray. Torrey's Blue-eyed Mary. Fig. 4751.

Collinsia Torreyi A. Gray, Proc. Amer. Acad. 7: 378. 1868.

Collinsia Torreyi var. *brevicarinata* Newsom, Bot. Gaz. 87: 299. 1929.

Plant 1-2 dm. tall, widely branched, the stem, pedicels, and calyces glandular-pilose. Leaf-blades widely linear, obtuse, entire or slightly dentate, 2.5-3.5 cm. long, attenuate to sessile or slightly petioled bases, proximally villulose on the midrib and petiole; inflorescence lax, the lowest bracts foliose, the others subulate and much shorter than the pedicels which become 5-10 mm. long and tend to reflex in fruit; corolla 7-9 mm. long, glabrous throughout, the basal pouch broadly rounded, upper lip white, proximally mauve-spotted, erect, the lower lip longer, its lateral lobes equaling or somewhat exceeding the lowermost lobe; capsule 3 mm. long; seeds 1 to a cell, 1.5 mm. long, oblong, turgid.

Granitic sand, clearings and open pine forest, Transition Zones; mountains, from Siskiyou County, northern California, south along the whole length of the Sierra Nevada and on the San Gabriel Mountains of Los Angeles County, southern California. Type locality: Big-tree Grove, Sierra Nevada, California. May-Aug.

Collinsia Torreyi var. *latifolia* Newsom, Bot. Gaz. 87: 299. 1929. Leaf-blades narrowly elliptic or oblong, rounded, only 3-4 times as long as wide. Sandy soil, Humid Transition Zone; Klamath Mountains near the coast of southern Oregon and northern California. June-Aug.

19. *Collinsia Wrightii* S. Wats. Wright's Blue-eyed Mary. Fig. 4752.

Collinsia Wrightii S. Wats. Proc. Amer. Acad. 24: 84. 1889.

Collinsia brachysiphon Eastw. Bull. Torrey Club 32: 214. 1905.

Collinsia monticola Davidson, Bull. S. Calif. Acad. 16: 13. 1917.

Collinsia Torreyi var. *Wrightii* I. M. Johnston, Pl. World 22: 115. 1919.

Collinsia Torreyi var. *brachysiphon* Jepson, Man. Fl. Calif. 905. 1925.

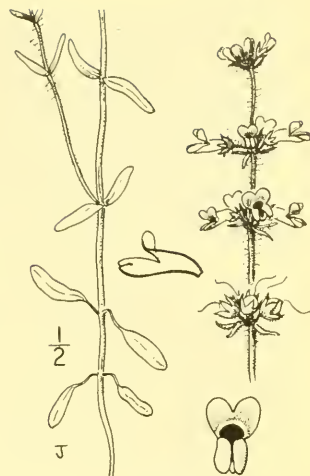
Plant 0.3-1 dm. tall, usually widely branched, the stems, pedicels, and calyces minutely



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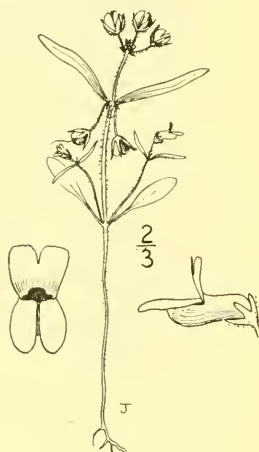
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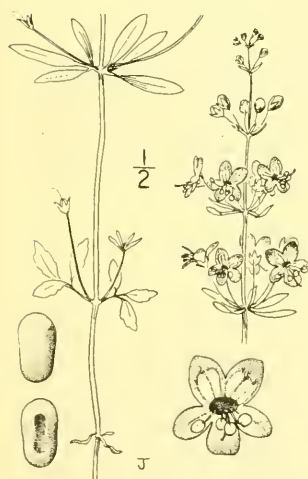
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4747. *Collinsia callosa*
 4748. *Collinsia Childii*
 4749. *Collinsia Greenei*

4750. *Collinsia Rattanii*
 4751. *Collinsia Torreyi*
 4752. *Collinsia Wrightii*

4753. *Tonella floribunda*
 4754. *Tonella tenella*
 4755. *Galvezia speciosa*

glandular-pilose. Leaf-blades oblong-linear, obtuse, entire, 1.5–2.5 cm. long, minutely pubescent or glabrous, attenuate to sessile or slightly petioled bases; inflorescence lax, the lowest bracts foliose, the others subulate and much shorter than the pedicels which become 5–10 mm. long and tend to reflex in fruit; corolla 4–5 mm. long, glabrous throughout, basal pouch rounded, the tube and upper lip white with violet lines, the latter with lobes erect and proximally medianly yellowish with dark markings, the lower lip longer, violet-blue, its lateral lobes much exceeding the lowermost lobe; capsule 3 mm. long; seeds 1 to a cell, 2 mm. long, oblong, turgid.

Granitic sand, Canadian Zone to Arctic-Alpine Zone; mountains, from Siskiyou County, northern California, south on the Sierra Nevada and adjacent ranges of western Nevada to the San Bernardino and San Gabriel Mountains of southern California. Type locality: Greenhorn Mountains, Kern County, California. June–Aug.

12. *TONÉLLA* Nutt. ex A. Gray, Proc. Amer. Acad. 7: 378. 1868.

Erect annual herbs. Leaves opposite, the lower or all tripartite. Flowers solitary or fascicled, axillary to the upper somewhat reduced leaves. Sepals 5, lanceolate, united over one-third their length. Corolla nearly rotate, glabrous, the five lobes obtuse or rounded, distally violet, proximally white and conspicuously marked with broken madder-violet lines. Stamens 4, equal and exserted, the filaments pubescent, the anthers glabrous with explanate cells. Capsule globose-ovoid, primarily septicidal, but eventually also loculicidal. Seeds maturing 1 or 2 to a cell, large, turgid, wingless. [Meaning unknown.]

Two species, of western North America. Type species, *Tonella collinsioides* Nutt.

Corolla 5–7 mm. wide, its distal violet portion smaller than the white proximal portion, which bears on the upper lobes conspicuous madder-violet radii, the upper longer than the lower lobes; sepals, pedicels, and stems distally glandular-pilose; flowers fascicled; plants mostly 2–3.5 dm. tall. 1. *T. floribunda*.

Corolla 2–2.5 mm. wide, its distal violet portion longer than the white and slightly marked proximal portion, the lower longer than the upper lobes, the lowermost lobe longest; sepals ciliate with glandless hairs; pedicels 1 or 2, distally finely glandular-pubescent; stems glabrous throughout; plants 1–2.5 dm. tall, very lax. 2. *T. tenella*.

1. *Tonella floribunda* A. Gray. Large-flowered *Tonella*. Fig. 4753.

Tonella floribunda A. Gray, Bot. Calif. 1: 556. 1876.

Collinsia floribunda Greene, Pittonia 1: 55. 1887.

Plant 2–3.5 dm. tall, erect, the stem, pedicels, and calyces finely glandular-pilose. Leaf-blades 2–5 cm. long, with segments lanceolate, the lateral lobes usually little shorter than the median blade, the lower leaves (with blades shorter and wider) usually lost by anthesis; upper axils floriferous, the linear bracts reduced toward stem-apex, each subtending 2 or 3 flowers, of which the pedicels become 10–20 mm. long; calyx 4 mm. long, its sepals united 1.5 mm., their free portions acute; corolla 5–7 mm. long, its distal violet portion smaller than the pale and conspicuously marked proximal portion, the upper larger than the lower lobes; capsule 3 mm. long; seeds 2 to a cell, 1.5 mm. long.

Loam banks, in canyons, Upper Sonoran Zone; along Snake River and tributaries in southeastern Washington, northeastern Oregon, and western Idaho. Type locality: Clearwater (Kooskooskie) River, Idaho. April–May.

2. *Tonella tenella* (Benth.) Heller. Small-flowered *Tonella*. Fig. 4754.

Collinsia tenella Benth. in A. DC. Prod. 10: 593. 1846.

Tonella collinsioides Nutt. ex A. Gray, Proc. Amer. Acad. 7: 378. 1868.

Tonella tenella Heller, Muhlenbergia 1: 5. 1900.

Plant 1–3 dm. tall, laxly ascending, the stem and pedicels glabrous, or minutely pubescent above nodes. Leaf-blades 1–1.5 cm. long, pilose on upper surface, with segments lance-oblong to oblong, the lateral lobes shorter than the median blade, the lower leaves (with blades shorter and wider, trilobed to entire) usually retained until anthesis; most axils floriferous, the lanceolate bracts foliose, each subtending 1 (or sometimes 2) flowers, of which the pedicels become 8–15 mm. long; calyx 2 mm. long, its sepals united 1 mm., their free portions acute to obtuse, ciliolate; corolla 2–2.5 mm. long, its distally violet portion longer than the white and slightly marked proximal portion, the upper smaller than the lower lobes; capsule 2–2.5 mm. long; seeds 1 to a cell, 1.5 mm. long.

Moist rocky soil, especially among scrub oaks, Upper Sonoran and Transition Zones; Pacific coastal region, southwestern Washington to central California. March–May.

13. *GALVÈZIA* Dombey ex. Juss. Gen. 119. 1789.

Erect or diffuse herbs or shrubs, with entire opposite or ternate leaves. Flowers axillary, forming a terminal raceme. Bracteoles none. Sepals 5, the lower pair shorter. Corolla tubular, red, externally pubescent, saccate at base beneath, strongly 2-lipped, the lower lip with a shallow 2-ridged palate. Stamens 4, didynamous, glabrous, the yellow anthers at orifice of corolla-tube. Stigmas united, punctiform. Capsule globose-ovoid, hirsute-pubescent, its cells unequal, the dorsal rounded at base and distally with two lateral ruptures, the ventral narrowed at base and distally with one large rupture. Seeds cylindric, with many thin wings. [Named in honor of José Galvez, a Spanish administrator.]

Species less than 10, in Lower California and on islands off the coast of southern California, and on the coast of Peru and Ecuador. Type species, *Galvezia fruticosa* J. F. Gmelin.

1. *Galvezia speciosa* (Nutt.) A. Gray. Showy Galvezia or Gambelia. Fig. 4755.

Gambelia speciosa Nutt. Proc. Acad. Phila. 4: 7. 1848.

Antirrhinum speciosum A. Gray, Proc. Amer. Acad. 7: 376. 1868.

Galvezia speciosa A. Gray, op. cit. 22: 311. 1887.

Plant forming wide clumps, shrubby below, the stems 10 dm. or more long, the young growth herbaceous, the inflorescence and often the new stems and leaves softly pubescent. Leaf-blades elliptic or narrowly so, mucronate or obtuse, semi-coriaceous, 3-4 cm. long, all narrowed to petioles 2-10 mm. long; floral bracts smaller and narrower; pedicels becoming 15-20 mm. long; sepals lanceolate-attenuate, the upper 8-10 mm. long, the lower slightly shorter; corolla 20-25 mm. long, the lips about 5 mm. long; capsule 7 mm. long; seeds 1 mm. long.

Rocky canyons, Upper Sonoran Zone; Santa Catalina and San Clemente Islands, southern California, and also Guadalupe Island off northern Lower California. Type locality: Santa Catalina Island, California. Feb.-May.

14. *ASARINA* [Lobel.] Mill. Gard. Dict. ed. 7. 1759.

Diffuse or twining perennial herbs. Leaves subopposite to usually scattered or alternate, the blades petiolate. Flowers axillary to foliose bracts. Bracteoles none. Sepals 5, distinct or slightly united at base. Corolla yellow, white, or violet-blue, 2-lipped, ventrally pouched at base, the ventral ridges prominent or united distally into a palate. Stamens 4, somewhat didynamous, the anthers tending to adhere and discharge pollen together. Stigmas united, small, slightly capitate. Capsule globose, rupturing across the distal portion of each cell. Seeds irregularly cylindric, with many longitudinal corky-thickened wing-ridges or lines of tubercles. [Name from the Latin, meaning like *Asarum*.]

Species 15 or 20, of Mexico and the southwestern United States, and also of southern Europe. Type species, *Antirrhinum Asarina* L.

Palate prominent, nearly or quite closing the orifice of the corolla; pedicels longer than the calyces; leaf-blades entire or trilobate; stems twining; plants mainly or wholly glabrous.

Leaf-blades narrowed to base, lanceolate; pedicels flexuous, many times longer than the calyces; plants villose near base.

Corolla yellow, its palate deeper yellow and puberulent, the basal pouch spur-like, obtuse, projecting from calyx; stems branched from base, extensively twining. 1. *A. filipes*.

Corolla violet, its pale palate violet-reticulated and densely white-pubescent, the basal pouch broadly rounded and scarcely projecting from calyx; stem usually unbranched at base, scarcely twining. 2. *A. stricta*.

Leaf-blades hastately lobed, triangular-ovate; pedicels firmer, 1-3 times the length of the calyces; plants glabrous throughout, the stems extensively twining. 3. *A. antirrhiniflora*.

Palate not developed, the corolla yellowish white, with strongly raised and yellow ventral ridges; pedicels shorter than the calyces; leaf-blades rounded-ovate, sinuately sharply toothed, the teeth aristate; stems pendent; plant hirsute. 4. *A. petrophila*.

1. *Asarina filipes* (A. Gray) Pennell. Yellow Twining Snapdragon. Fig. 4756.

Antirrhinum filipes A. Gray, Ives Rep. 19. 1860.

Antirrhinum Cooperi A. Gray, Proc. Amer. Acad. 7: 376. 1868.

Asarina filipes Pennell, Proc. Acad. Phila. 99: 174. 1947.

Plant glabrous and slightly glaucous, its branched stems diffuse, both the stems and pedicels twining around supports in climbing. Leaf-blades entire, mostly lanceolate and 3-5 cm. long, the lower shorter and wider, all narrowed to petioles 2-6 mm. long; pedicels becoming 30-70 mm. long, very slender; sepals 2.5-4 mm. long, lanceolate, entire; corolla 10-12 mm. long, yellow, with raised golden-yellow black-dotted palate; capsule 5 mm. long; seeds black, 1 mm. long and wide, the wings continuous.

Sandy soil in deserts, Lower and Upper Sonoran Zones; Great Basin and Mojave Desert, southeastern Oregon to southern California and southwestern Utah. Type locality: along Colorado River in southern Mohave County, Arizona. Feb.-May.

2. *Asarina stricta* (Hook. & Arn.) Pennell. Lax Snapdragon. Fig. 4757.

Maurandya stricta Hook. & Arn. Bot. Beechey 375. 1838.

Antirrhinum strictum A. Gray, Proc. Amer. Acad. 7: 375. 1868. Not *A. strictum* Sibth. & Sm. 1826.

Antirrhinum Kelloggii Greene, Bull. Torrey Club 10: 126. 1883.

Antirrhinum Hookerianum Pennell ex Millsp. Field Mus. Bot. Ser. 5: 222. 1923.

Asarina stricta Pennell, Proc. Acad. Phila. 99: 175. 1947.

Plant glabrous and slightly glaucous, its stems simple or somewhat branched, laxly diffuse, the pedicels twining around supports in climbing. Leaf-blades entire, mostly lanceolate and 3-6 cm. long, the lower shorter and wider, all narrowed to petioles 3-7 mm. long; pedicels becoming 50-80 mm. long, slender; sepals 5-6 mm. long, linear-lanceolate, entire; corolla 12-15 mm. long, violet, with raised pale violet-reticulated palate; capsule 6 mm. long; seeds pale or gray, 0.7 mm. long, the wings broken and plate-like.

Loam soil, openings in chaparral, Upper Sonoran Zone; coastal hills, Marin County, central California, south to northern Lower California. Type locality: California. April-May.

3. *Asarina antirrhiniflora* (Humb. & Bonpl.) Pennell. Violet Twining Snapdragon. Fig. 4758.

Maurandya antirrhiniflora Humb. & Bonpl. ex Willd. Hort. Berol. pl. 83. 1807.
Antirrhinum maurandioides A. Gray, Proc. Amer. Acad. 7: 376. 1868.
Antirrhinum antirrhiniflora A. S. Hitchcock, Rep. Mo. Bot. Gard. 4: 113. 1893.
Asarina antirrhiniflora Pennell, Proc. Acad. Phila. 99: 174. 1947.

Plant glabrous, the stems much-branched, diffuse and extensively twining, the petioles and pedicels also incurved and somewhat flexuous. Leaf-blades hastate-ovate, 1.5–2.5 cm. long and wide, both main blade and lateral lobes acuminate, narrowly cordate to petioles 10–30 mm. long; pedicels becoming 10–30 mm. long, slender; sepals 10–13 mm. long, linear-lanceolate, entire; corolla 20–25 mm. long, its tube pale and dull, its lobes violet to purple, with an upraised yellowish white dark-lined pubescent palate that closes orifice; capsule 6 mm. long; seeds brown, 1 mm. long, irregularly corky-winged, the wings broken and some mere lines of tubercles.

Sandy, gravelly, or rocky soil, usually calcareous, Lower and Upper Sonoran Zones; desert mountains, southeastern California to central Texas, south to Oaxaca in southern Mexico. April–May.

4. *Asarina petrophila* (Cov. & Mort.) Pennell. Death Valley *Maurandya*. Fig. 4759.

Maurandya petrophila Cov. & Mort. Journ. Wash. Acad. 25: 292. 1935.
Asarina petrophila Pennell, Proc. Acad. Phila. 99: 175. 1947.

Plant pendent, softly hairy, its short stems much-branched. Leaf-blades rotund-ovate, 2–3 cm. long and wide, irregularly dentate with callose bristly teeth, rounded or truncate to petioles 13–18 mm. long; pedicels 2–3 mm. long, stout; sepals 15 mm. long, lanceolate, dentate with slender spine-like teeth; corolla 33–35 mm. long, pale yellow, its cylindric throat open, ventrally with 2 narrow deep yellow finely pilose ridges, its lobes all spreading; capsule about 9 mm. long; seeds pale yellow or gray, 2.5 mm. long, with lines of spongy tubercles.

Crevices of limestone rock, Lower Sonoran Zone; Grapevine Mountains, beside Death Valley, Inyo County, California. Type locality: Titus Canyon, Grapevine Mountains, California. April.

15. LINARIA [Bauhin] Mill. Gard. Dict. ed. 4. 1754.

Erect or diffuse annual- or perennial-rooted glabrous herbs, the scattered narrow leaves all sessile. Flowers in terminal racemes, the bracts short. Bracteoles none. Sepals 5, distinct. Corolla yellow or violet, ventrally spurred at base, 2-lipped, the lower often raised into a palate. Stamens 4, didynamous, the glabrous anthers distinct. Stigmas united, scarcely capitate. Capsule cylindric to globose, rupturing irregularly across the distal side of each cell; seeds various. [Named from the Latin because of the resemblance of some species to *Linum*, flax.]

About 100 species, mostly Palaearctic, the 3 species of *Leptoplectron* Nearctic. Type species, *Antirrhinum Linaria* L.

Corolla yellow, with prominent orange palate, the spur stout, straight or nearly so; capsule longer than wide; seed with wide circular wing; root perennial. I. LINARIASTRUM.

Corolla violet or violet-purple, with scarcely evident pale palate, the spur slender, decurved; capsule as wide as long; seeds cylindric, prismatic-angled; root annual or biennial. II. LEPTOPLECTRON.

I. LINARIASTRUM.

Our single species naturalized from Europe.

1. *L. vulgaris*.

II. LEPTOPLECTRON.

Surfaces and rounded angles of seeds densely tuberculate; corolla over 10 mm. long, excluding spur which is 5–9 mm. long. 2. *L. texana*.

Surfaces of seed smooth or nearly so, the angles thin and usually sharp; corolla less than 10 mm. long, excluding spur which is 2–6 mm. long. 3. *L. canadensis*.

1. *Linaria vulgaris* Hill. Butter-and-Eggs. Fig. 4760.

Antirrhinum Linaria L. Sp. Pl. 616. 1753.
Linaria vulgaris Hill, Brit. Herb. 109. 1756.
Linaria Linaria Karst. Deutsch. Fl. 947. 1880–83.

Strong-scented perennial, the stems 5–10 dm. tall, and the numerous leaves widely linear. Corolla 15–20 mm. long, excluding spur, its orifice closed by palate; capsule 9–12 mm. long, rupturing near apex; seeds 1.5 mm. wide, flattened.

Established as a weed through most of temperate North America; naturalized from Eurasia. Summer.

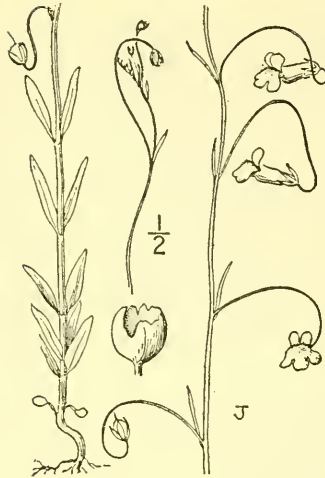
2. *Linaria texana* Scheele. Larger Blue Toad-flax. Fig. 4761.

Linaria texana Scheele, Linnaea 21: 761. 1848.
Linaria canadensis var. *texana* Pennell, Proc. Acad. Phila. 73: 502. 1921.

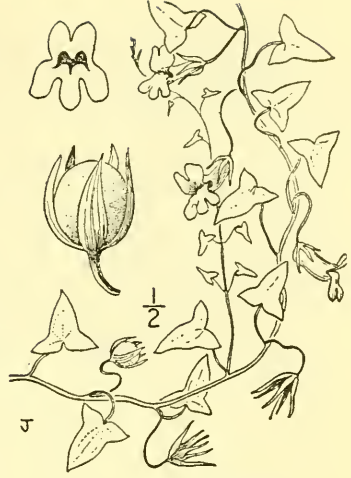
Inodorous annual or winter biennial, the flowering stems erect, 3–7 dm. tall, often at base with short spreading prostrate branches. Leaves narrowly linear, rather sparse distally;



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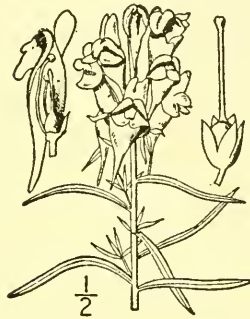
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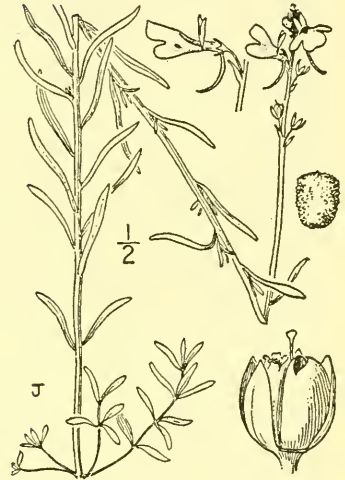
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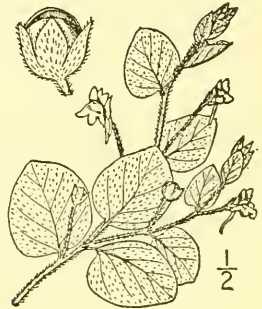
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4756. *Asarina filipes*
 4757. *Asarina stricta*
 4758. *Asarina antirrhiniflora*
 4759. *Asarina petrophila*

4760. *Linaria vulgaris*
 4761. *Linaria texana*
 4762. *Linaria canadensis*

4763. *Cymbalaria muralis*
 4764. *Kickxia spuria*
 4765. *Kickxia elatine*

corolla violet or nearly so, 10–12 mm. long, excluding spur; capsule 2.5–3.5 mm. long, rupturing one-third to one-half its depth; seeds with rounded densely tuberculate angles.

Sandy soil, Upper Sonoran and Transition Zones; southern British Columbia to northern Lower California, east over southern United States to the Atlantic Coast and Mexico. Type locality: between Houston and Austin, Texas. March–May.

3. *Linaria canadensis* (L.) Dumont. Smaller Blue Toad-flax. Fig. 4762.

Antirrhinum canadense L. Sp. Pl. 618. 1753.

Linaria canadensis Dumont, Bot. Cult. 2: 96. 1802.

Inodorous annual or winter biennial, the flowering stems erect, 3–7 dm. tall, often at base with short spreading prostrate branches. Leaves narrowly linear, sparse distally; corolla violet or nearly so, 8–10 mm. long, excluding spur; capsule 2–3 mm. long, rupturing one-third to one-half its depth; seeds smooth and with sharp angles.

Sandy soil, Transition Zones; occasional on the Pacific Slope from British Columbia to central California; and widespread over the eastern United States. Type locality: actually Raccoon in southern New Jersey. April–June.

16. CYMBALÀRIA [Bauhin] Hill, Brit. Herb. 113. 1756.

Procumbent twining biennial- or annual-rooted glabrous herb, the leaves opposite or scattered and with palmate petioled blades. Flowers axillary to foliage leaves, long-pedicelled. Bracteoles none. Sepals 5, distinct. Corolla violet, ventrally spurred at base, 2-lipped, the lower side of the throat densely hairy and terminating in a glabrous yellow palate, from which the lower lobes deflex. Stamens 4, didynamous, the anthers glabrous and somewhat coherent. Capsule globose, rupturing irregularly across the distal width of each cell. Seeds nearly globose, with many corky wings. [From the Greek word meaning cymbal.]

Species about 10, Palearctic, mostly in the Mediterranean subregion. Type species, *Antirrhinum Cymbalaria* L.

1. *Cymbalaria muralis* Gärtn. Mey. & Scherb. Kenilworth Ivy. Fig. 4763.

Antirrhinum Cymbalaria L. Sp. Pl. 612. 1753.

Cymbalaria muralis Gärtn. Mey. & Scherb. Fl. Wett. 2: 397. 1800.

Cymbalaria Cymbalaria Wettst. in Engler & Prantl, Nat. Pflanzenf. IV. 3b: 58. 1891.

Leaf-blades with 5–7 bluntly acuminate lobes, cordate to long petioles; sepals 3 mm. long, lanceolate; corolla 7 mm. long, excluding the straight spur which is 3 mm. long; capsule 4 mm. long; seeds 0.5 mm. long, black.

Cultivated on walls, and somewhat escaped in the moist cool areas of the Pacific Slope from British Columbia to central California. Type locality: Europe. May–Sept.

17. KÍCKXIA Dumort. Fl. Belg. 35. 1827.

Diffuse repent perennial-rooted hairy herbs, the scattered leaves with wide-petioled blades. Flowers axillary to foliage leaves, long-pedicelled. Bracteoles none. Sepals 5, distinct. Corolla white or yellowish white, ventrally spurred at base, 2-lipped, with a pubescent yellow palate from which the lower lobes deflex. Stamens 4, didynamous, the ciliate anthers more or less coherent. Stigmas minute, wholly united. Capsule globose, most of the wall of each cell dehiscing as a lid. Seeds brown, oval, alveolate with thin wing-like irregular convolutions. [Named in honor of Jean Kickx, a Belgian professor.]

About 30 species, Palearctic, mostly in the Mediterranean subregion. Type species, *Antirrhinum Elatine* L.

Leaf-blades rounded or cordate at base; sepals ovate; corolla 6–8 mm. long; anthers usually somewhat coherent.

1. *K. spuria*.

Leaf-blades hastate-lobed at base; sepals lanceolate; corolla 5 mm. long; anthers wholly coherent.

2. *K. Elatine*.

1. *Kickxia spuria* (L.) Dumort. Round-leaved Fluellin. Fig. 4764.

Antirrhinum spurium L. Sp. Pl. 613. 1753.

Kickxia spuria Dumort. Fl. Belg. 35. 1827.

Leaf-blades ovate or widely circular, 2.5–4 cm. long and wide, rounded or truncate to petioles 2–5 mm. long; pedicels becoming 10–15 mm. long; sepals ovate; corolla 6–8 mm. long, the spur 5 mm. long; capsule 3–4 mm. long; seeds 1 mm. long.

Occasionally naturalized, as in Napa County, California. Type locality: Europe. June–Sept.

2. *Kickxia Elatine* (L.) Dumort. Sharp-leaved Fluellin. Fig. 4765.

Antirrhinum Elatine L. Sp. Pl. 612. 1753.

Kickxia Elatine Dumort. Fl. Belg. 35. 1827.

Leaf-blades ovate, 1–3 cm. long by 0.8–2.5 cm. wide, hastate with 1–3 low basal lobes, cordate to petioles 2–5 mm. long; pedicels becoming 10–25 mm. long, very slender; sepals



4766



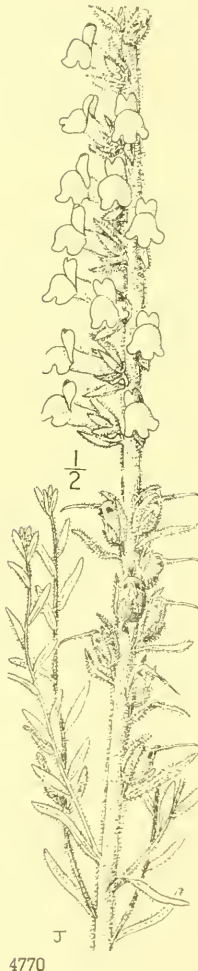
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4766. *Mohavea breviflora*
 4767. *Mohavea confertiflora*
 4768. *Antirrhinum majus*

4769. *Antirrhinum virga*
 4770. *Antirrhinum multiflorum*
 4771. *Antirrhinum Coulterianum*

4772. *Antirrhinum cornutum*
 4773. *Antirrhinum Breweri*

lanceolate; corolla 5 mm. long, the spur 4 mm. long; capsule 3–4 mm. long; seeds 1–1.2 mm. long.

Occasionally naturalized in old fields, as in Humboldt County, California. Type locality: Europe. June–Sept.

18. *MOHAVEA* A. Gray, Pacif. R. Rep. 4: 122. 1857.

Erect annual hairy herbs, the scattered leaves with narrow sessile blades. Flowers axillary to foliose bracts, short-pedicelled in close racemes. Bracteoles none. Sepals 5, distinct. Corolla yellow or yellowish, ventrally slightly pouched at base, 2-lipped, its orifice nearly or quite closed by the large hairy palate. Antheriferous stamens 2 (the ventral pair), the glabrous anthers with divaricate cells. Stigmas wholly united, capitate, borne on the wholly united pubescent persistent styles. Capsule ovoid, cylindric, the cells rupturing widely by irregular transverse distal breaks. Seeds ovate-discoïd, flattened, each surrounded by its incurved wing. [Named from the Indian word Mojave, the plant first found on "Mohave Creek."]

Species 2, of arid western North America. Type species, *Mohavea viscida* A. Gray.

Corolla 15–17 mm. long, bright yellow, the ample palate inflated-rounded and distally with fine garnet-brown markings, simply bilabiate, each lip with its free petals extending as ovate lobes from near the margin of the palate; leaves lanceolate; plants with strongly gland-tipped hairs. 1. *M. breviflora*.

Corolla 30–35 mm. long, the narrow palate less inflated, yellow and lined or mottled or distally blotched with dark violet, its lips yellow, each distally expanded and together forming an ample campanulate limb that is pale greenish yellow and marked by radiating dark brown broken lines, each petal distinct near the semitruncate mucronately acuminate tip; leaves linear-lanceolate; plants with obscure gland-tipped hairs. 2. *M. confertiflora*.

1. *Mohavea breviflora* Coville. Golden Desert Snapdragon. Fig. 4766.

Mohavea breviflora Coville, Contr. U.S. Nat. Herb. 4: 168. 1893.

Stem 1–2 dm. tall, floriferous nearly throughout, the floral leaves lanceolate to ovate-lanceolate, 2–4 cm. long. Pedicels becoming 2–5 mm. long; sepals 10–11 mm. long, lanceolate-attenuate; corolla 15–17 mm. long; capsule 8–10 mm. long; seeds 2–2.5 mm. long, black.

Gravelly calcareous soil, Lower Sonoran Zone; deserts of Inyo County, southeastern California, to southern Nevada and northwestern Arizona. Type locality: Johnson Canyon, Panamint Mountains, California. March–April.

2. *Mohavea confertiflora* (Benth.) Heller. Mohave Flower. Fig. 4767.

Antirrhinum confertiflorum Benth. in A. DC. Prod. 10: 592. 1846.

Mohavea viscida A. Gray, Pacif. R. Rep. 4: 122. 1857.

Mohavea confertiflora Heller, Muhlenbergia 8: 48. 1912.

Stem 2–5 dm. tall, floriferous distally, the leaves all linear or lance-linear, the floral ones 6–9 cm. long. Pedicels becoming 5–10 mm. long; sepals 11–13 mm. long, lanceolate-attenuate; corolla 30–35 mm. long; capsule 10–12 mm. long; seeds 2–2.5 mm. long, black.

Sandy desert, Lower Sonoran Zone; Mojave and Colorado Deserts of southern California to southern Nevada and western Arizona. Type locality: California. March–April.

19. *ANTIRRHINUM* [Bauhin] L. Sp. Pl. 612. 1753.

Erect or diffuse perennial- or annual-rooted herbs. Leaves scattered, the blades narrow or wide. Flowers racemose, either axillary to foliage leaves or crowded and with much-reduced bracts. Sepals 5, distinct. Corolla cyanic (violet-blue, purple, or white), ventrally pouched at base, 2-lipped, the lower lip with prominent palate. Stamens 4, didynamous. Stigmas united, minute. Capsule asymmetrical, the dorsal cell narrower and opening by a single distal pore, the lower set wholly ventrad to pedicel-apex and opening distally by 2 distal pores (or these confluent), the style persisting and deflexed. [Name Greek, meaning against the nose, the lower lip closing against the snout-like upper one.]

About 30 species, most numerous in the Mediterranean Region, and also in California and adjoining territory. Type species, *Antirrhinum majus* L.

Uppermost sepal not longer than others; corolla 35 mm. long or more, variously colored, the upper lip arched and projecting beyond the decurved lower lobes, the orifice closed by palate; capsule 10–12 mm. long; escaped from cultivation. 1. *A. majus*.

Uppermost sepal longer and larger than others; corolla less than 25 mm. long, violet-blue or purple to white; capsule 3–8 mm. long; indigenous.

Leaf-blades over twice as long as wide, cuneate or attenuate to petioles.

Stems stout, erect from woody roots; corolla purple, its palate bladdery-inflated, soon withering to brown; seeds about 1 mm. long, the sharp ridges somewhat erose.

Plant (including capsule and external surface of corolla) glabrous, the clustered stems simple or virgately branched, 15–20 dm. tall; root clearly perennial; sepals attenuate-lanceolate; leaf-blades lance-linear. 2. *A. virga*.

Plant (including capsule and external surface of corolla) glandular-hirsute, the stem widely branched below, 6–9 dm. tall; root apparently annual; uppermost sepal acute or acutish, the others acuminate-attenuate; leaf-blades oblong-lanceolate. 3. *A. multiflorum*.

Stems slender, from clearly annual roots; corolla blue-violet to white, its palate not so quickly shriveling; seeds usually smaller and less sharply angled.

Flowers only toward summit of stem, the dense inflorescence glandular-hirsute, its minute bracts

shorter than flowers or fruits; corolla 8–12 mm. long, the ample lower lip projecting far beyond upper and decurved-recurved distally and laterally; stem erect, glabrous between the lanulose crown and the inflorescence. 4. *A. Coulterianum*.

Flowers scattered nearly whole length of stem, the lax inflorescence usually loosely glandular-pubescent and often with foliose bracts; lower corolla-lip with lobes deflexed from the prominent palate; stems more laxly ascending.

Nectar-pouch spur-like, deeper than wide and deflexed; corolla 10–12 mm. long, violet-reticulate, upper lip not exceeding the hirsute palate; uppermost sepal little larger than others; stems erect, 2–5 dm. tall, without tortile branches, the plant glandular-hirsute throughout. 5. *A. cornutum*.

Nectar-pouch shallower than wide and not deflexed; corolla less obviously reticulate-veined; uppermost usually about twice as wide or long as lower sepals; branches often tortile.

Corolla blue-violet, 10–15 mm. long; capsule longer than wide; stem glandular-hairy, at least in inflorescence.

Width of corolla less than one-half length, the erect upper lip scarcely longer than diameter of orifice, and lower lobes little deflexed from the hirsute-villose palate; sepals shorter than capsule, or the uppermost equaling or slightly exceeding it; stem glandular-pubescent to base. 6. *A. Breweri*.

Width of the relatively larger corolla nearly or fully equaling its length, the erect upper lip longer than diameter of orifice, and lower lobes strongly deflexed from the pubescent palate; sepals all longer than capsule; stem proximally hirsute-pilose with glandless hairs. 7. *A. vexillo-calyculatum*.

Corolla whitish, 5–7 mm. long; capsule as wide as long; stem glabrous or nearly so above the lanulose base, but sepals and sometimes pedicels minutely glandular-pubescent. 8. *A. Kingii*.

Leaf-blades less than twice as long as wide, rounded to subcordate at base and usually rounded at apex; stem glandular-pubescent to hirsute, floriferous throughout, the bracts foliose and the branches somewhat prehensile.

Sepals similar, lanceolate or ovate-lanceolate, the uppermost 4–5 mm. long, the others 2–3 mm. long; corolla violet-blue, 8–10 mm. long, with palate closing the orifice; pedicels 3–20 mm. long. 9. *A. Nuttallianum*.

Sepals dissimilar, the uppermost 10–12 mm. long and rounded, the others 6–8 mm. long, lanceolate with acute or attenuate tips; pedicels 1–3 mm. long.

Corolla 13–16 mm. long, its orifice closed by the wide pubescent palate; bracts divaricately spreading, much-exceeded by the many slender few-leaved flexuous branchlets. 10. *A. subcordatum*.

Corolla 22–23 mm. long, its orifice not closed by the glabrous palate, the upper lip pink, the lower white; bracts ascending, the ascending branches floriferous and somewhat flexuous, normally leafy. 11. *A. ovatum*.

1. *Antirrhinum majus* L. Garden Snapdragon. Fig. 4768.

Antirrhinum majus L. Sp. Pl. 617. 1753.

Plant glabrous below the glandular-pubescent inflorescence. Flowers forming a close raceme, the bracts little exceeding the pedicels which are erect and 5 mm. long; sepals alike, oval, 5–6 mm. long; corolla 35 mm. long, purple, with hairy yellow palate closing orifice to throat; capsule 10–12 mm. long.

Occasional escape from gardens, at least near Portland, Oregon. Naturalized from Europe. March–May.

2. *Antirrhinum virga* A. Gray. Tall Snapdragon. Fig. 4769.

Antirrhinum virga A. Gray, Proc. Amer. Acad. 7: 373. 1868.

Plant perennial-rooted, branched at base, glabrous throughout, the simple or distally branched wand-like stems 15–20 dm. tall. Leaves numerous, their sessile blades linear-lanceolate, 5–8 cm. long; inflorescence a close raceme, with linear bracts that little exceed the pedicels that are erect and 2–5 mm. long; sepals lanceolate, sharply acute, the uppermost 6–7 mm. long, the lower pair 5 mm. long; corolla 15 mm. long, externally glabrous and pale purple, internally pubescent on lower side, its basal pouch forming a short pale spur as deep as long, its upper lip with short upcurved pale-margined lobes, its lower lip with projecting bladderly-inflated white palate from recurved apex of which depend the very short lobes, both lips soon shriveled and light brown; anthers orange-yellow; capsule 6–7 mm. long, glabrous, the glabrous style becoming much-deflexed; seeds 1 mm. long, with many thin erose wings.

Open gravelly places, chaparral, Upper Sonoran Zone; Mendocino County to Lake and Sonoma Counties, central California. Type locality: California. June–July.

3. *Antirrhinum multiflorum* Pennell. Withered Snapdragon. Fig. 4770.

Antirrhinum glandulosum Lindl. Bot. Reg. 22: pl. 1893. 1836. Not *A. glandulosum* Lejeune, Fl. Spa 320. 1811–13.

Plant annual-rooted, glandular-hirsute, much-branched throughout, 6–9 dm. tall, the numerous leaves oblong-lanceolate, acute to obtuse, 4–7 cm. long, narrowed to sessile bases. Inflorescence a second close raceme with lance-attenuate bracts about equaling pedicels plus calyces, the erect pedicels becoming 2–4 mm. long; sepals lanceolate, acute, the uppermost 9 mm. long, the lower pair 6 mm. long; corolla 20 mm. long, externally glandular-pilose and pale purple, internally pubescent on lower side, its basal pouch shallowly rounded and wider than deep, its upper lip violet-purple with sagittally erect lobes, its lower lip with projecting yellowish white palate closing orifice, its free lobes short and deflexed, both lips soon becoming shriveled and brown; anthers yellow; capsule 9 mm. long, glandular-hirsute, the hairy style deflexed to 90°; seeds 1 mm. long, alveolate-lined with thin erose wings.

Calcareous or granitic soil, Upper Sonoran Zone; in the foothills of the Sierra Nevada from Calaveras County to Tuolumne County, and through the coastal mountains from Santa Clara County to Los Angeles and San Bernardino Counties, California. Type locality: California. May–July.

4. *Antirrhinum Coulterianum* Benth. White Snapdragon. Fig. 4771.

Antirrhinum Coulterianum Benth. in A. DC. Prod. 10: 592. 1846.

Antirrhinum Nevinianum ("nivenianum") A. Gray, Bot. Gaz. 9: 54. 1884.

Antirrhinum Coulterianum var. *Nevinianum* Jepson, Man. Fl. Pl. Calif. 899. 1925.

Plant annual, glabrous below the glandular-hirsute inflorescence, 8–14 dm. tall, with slender flexile branches that act as tendril holdfasts. Leaves sparse, the blades elliptic-oblongate, acute or acutish, reaching 3–6 cm. long, attenuate to sessile or short-petioled bases; inflorescence a terminal secund close raceme, with linear-subulate bracts little exceeding the pedicels that are erect and 2–4 mm. long; sepals oblong-lanceolate, acute, the uppermost 6 mm. long, the lower pair 3 mm. long; corolla 10–12 mm. long, white, externally pubescent, its tube very narrow and gibbous beneath nearly entire length, its upper lip erect, its lower lip much larger with broad puberulent palate that is faintly violet-lined and -spotted, the decurved lobes broad and spreading; anthers blackish; capsule 8 mm. long, glandular-pubescent, the short hairy style only slightly deflexed; seeds nearly 1 mm. long, with many thin even wing-ridges.

Sandy or loamy soil, chaparral, Upper Sonoran Zone; Los Angeles and San Bernardino Counties to San Diego County, southern California. Type locality: California. April–June.

Antirrhinum Coulterianum subsp. *Orcuttianum* (A. Gray) Pennell. (*Antirrhinum Orcuttianum* A. Gray, Bot. Gaz. 9: 54. 1884; *A. Coulterianum* f. *Orcuttianum* Munz, Proc. Calif. Acad. IV, 15: 355. 1926.) Corolla smaller, 8–9 mm. long, violet. Similar environment, Upper Sonoran Zone; San Diego County, California, south into northern Lower California. Type locality: San Diego County, California. April–May.

5. *Antirrhinum cornutum* Benth. Spurred Snapdragon. Fig. 4772.

Antirrhinum cornutum Benth. Pl. Hartw. 328. 1849.

Antirrhinum cornutum var. *venosum* Jepson, Man. Fl. Pl. Calif. 898. 1925.

Plant annual, glandular-pubescent throughout, 3–5 dm. tall, simple or branched. Leaf-blades narrowly oblong, rounded, reaching 1.5–2 cm. long, narrowed to short petioles; inflorescence a broken raceme, nearly all leaves with axillary flowers, their pedicels only 2 mm. long; sepals oblong-lanceolate, acute, the uppermost 5 mm. long, the lower pair 4 mm. long; corolla 10–12 mm. long, pale violet, externally pubescent, its basal pouch spur-like (deeper than wide), its upper lip upcurving-erect and lined with darker violet, its lower lip much larger and with raised hairy palate that is pale and violet-reticulated and from which depend the short free lobes; anthers purple; capsule 5 mm. long, glandular-pubescent, the long glandular-hairy style somewhat deflexed; seeds 1 mm. long, alveolate-reticulate.

Moist soil, adobe, over serpentine, etc., Upper Sonoran Zone; Humboldt and Shasta Counties to Napa and Eldorado Counties, northern California. Type locality: Sacramento River Valley, California. June–July.

Antirrhinum cornutum var. *leptaleum* (A. Gray) Munz, Proc. Calif. Acad. IV, 15: 351. 1926. (*Antirrhinum leptaleum* A. Gray, Proc. Amer. Acad. 7: 373. 1869; *A. emarginatum* Eastw. Bull. Torrey Club 32: 214. 1905.) Style shorter, 4 mm. long, slightly shorter than (instead of as long as) the capsule, and the filaments less hairy. Upper Sonoran Zone; foothills of Sierra Nevada from Mariposa County to Kern County, central California. Type locality: Clark's Ranch, Mariposa County, California.

6. *Antirrhinum Breweri* A. Gray. Brewer's Snapdragon. Fig. 4773.

Antirrhinum Breweri A. Gray, Proc. Amer. Acad. 7: 374. 1868.

Antirrhinum Breweri var. *ovalifolium* A. Gray, op. cit. 375.

Antirrhinum vagans var. *Breweri* Jepson, Fl. W. Mid. Calif. 397. 1901.

Antirrhinum vexillo-calyculatum var. *Breweri* Munz, Proc. Calif. Acad. IV, 15: 364. 1926.

Plant annual, loosely glandular-pubescent throughout, 3–6 dm. tall, much-branched (branches hardly tortile, and with small remote leaves). Leaf-blades linear- to elliptic-oblong, rounded, reaching 1.5–3.5 cm. long, narrowed to short petioles; sepals linear, acute, the uppermost 6 mm. long, the lower pair 4 mm. long; corolla 10–12 mm. long, lavender-violet, externally hirsute-pubescent, its basal pouch low and rounded, its upper lip upcurving-erect, both tube and upper lip violet-lined, its lower lip much larger and with strongly raised pale pubescent palate (tightly closing orifice), from which depend the short free lobes; anthers yellow; capsule 5 mm. long, minutely glandular-pubescent, the long finely hairy style somewhat deflexed; seeds 1 mm. long, alveolate-reticulate.

Open stony and rocky places, over basalt, limestone, and serpentine. Transition Zones; Klamath Mountains of southwestern Oregon, south along the Coast Ranges to Sonoma County, and along the Sierra Nevada to Mariposa County, California. Type locality: upper Sacramento River, California. June–Aug.

7. *Antirrhinum vexillo-calyculatum* Kell. Wiry Snapdragon. Fig. 4774.

Antirrhinum glandulosum Kell. The Pacific (February 2). 1854. Not *A. glandulosum* Lejeune, 1811–13.

Antirrhinum vexillo-calyculatum Kell. Proc. Calif. Acad. 1: 27. (February) 1855.

Antirrhinum Coulterianum var. *appendiculatum* Dur. & Hilg. Journ. Acad. Phila. II, 3: 43. (May) 1855.

Antirrhinum vagans A. Gray, Proc. Amer. Acad. 7: 375. 1868.

Antirrhinum vagans var. *Bolanderi* A. Gray, loc. cit.

Antirrhinum appendiculatum Heller, Muhlenbergia 1: 44. 1904.

Antirrhinum vagans var. *rimorum* Jepson, Man. Fl. Pl. Calif. 900. 1925.

Plant annual, loosely glandular-pubescent proximally, 3–9 dm. tall, much-branched (branches flexuous and somewhat tortile, with a few remote leaves). Leaf-blades linear- to elliptic-oblong, rounded, reaching 1.5–2.5 cm. long, narrowed to petioles often half the length of blades; inflorescence distally a second raceme, the lower flowers remote and on pedicels becoming 2 mm. long; sepals dissimilar, the uppermost oblong, 8–10 mm. long, the others linear-lanceolate, 6–7

mm. long; corolla 12–15 mm. long, lavender-violet, externally hirsute-pubescent, its basal pouch rounded and about as deep as wide, its upper lip erect, with unlined lobes that reflex laterally, its lower lip much larger and with vertically upraised puberulent pale or whitish palate (tightly closing against orifice), from which spread the ample lobes; anthers yellow; capsule 6 mm. long, glandular-pubescent, the long finely glandular-pubescent style deflexed to 90°; seeds 1 mm. long, alveolate-reticulate.

Rocky chaparral, often on serpentine, Upper Sonoran and Transition Zones; coastal hills and ranges from Mendocino County to San Benito County, California. Type locality: near Punta de los Reyes, California. May–Aug.

8. *Antirrhinum Kingii* S. Wats. Least Snapdragon. Fig. 4775.

Antirrhinum Kingii S. Wats. Bot. King Expl. 215. pl. 21. 1871.

Plant annual, glabrous below the sparsely glandular-pubescent inflorescence, 1.5–3 dm. tall, simple or somewhat branched. Leaf-blades oblanceolate-oblong, rounded, reaching 1–2 cm. long, narrowed to short petioles; inflorescence distally a secund raceme, the lower flowers remote and on pedicels becoming 2–5 mm. long; sepals dissimilar, the uppermost linear-oblong, 4 mm. long, the others linear-lanceolate, 2 mm. long; corolla 5–7 mm. long, whitish with purple veins, externally pubescent, its basal pouch shallow and rounded, wider than deep, its lips equal, the upper ascending, the lower with a medianly finely villose palate (not closing orifice) and with deflexed-decurved lobes; anthers dark violet; capsule 3–4 mm. long, glabrescent; seeds 0.5 mm. long, lined with thin and somewhat broken wing-ridges.

Calcareous gravelly desert, Upper Sonoran Zone; Interior Plateau, southeastern Oregon to eastern California and southern Nevada, east to southern Idaho and western Utah. Type locality: Nevada. May–June.

9. *Antirrhinum Nuttallianum* Benth. Nuttall's Snapdragon. Fig. 4776.

Antirrhinum Nuttallianum Benth. in A. DC. Prod. 10: 592. 1846.

Antirrhinum Nuttallianum var. *efusum* A. Gray, Bot. Calif. 1: 622. 1876.

Antirrhinum subsessile A. Gray, Bot. Gaz. 9: 54. 1884.

Antirrhinum Nuttallianum var. *subsessile* Jepson, Man. Fl. Pl. Calif. 899. 1925.

Plant annual, glandular-pubescent throughout, diffusely ascending, 4–12 dm. tall, much-branched. Lower leaf-blades ovate, acute, reaching 2–3 cm. long, rounded to short petioles, the upper blades smaller, rounded at apex and often cordate at base; inflorescence loosely racemose (with foliose bracts), the pedicels 3–20 mm. long; sepals lanceolate, acute, the uppermost 4–5 mm. long, the others 2–3 mm. long; corolla 8–10 mm. long, violet, externally finely pubescent, its basal pouch pale, shallow and rounded, wider than deep, the tube beneath pale and violet-lined but distally yellow, its upper lip ascending-erect and dark violet, its lower lip longer, with large violet-reticulate glabrous palate (closing orifice), from which depend the violet lobes; anthers dark, with white pollen; capsule 7–8 mm. long, finely glandular-pubescent; seeds 0.5 mm. long, blackish, with many narrow wing-ridges.

Sandy or rocky soil, Lower and Upper Sonoran Zones; near the coast from Santa Barbara County to San Bernardino and San Diego Counties, southern California, southward into northern Lower California; also in southern Arizona. Type locality: San Diego, California. March–July.

10. *Antirrhinum subcordatum* A. Gray. Dimorphic Snapdragon. Fig. 4777.

Antirrhinum subcordatum A. Gray, Proc. Amer. Acad. 20: 306. 1885.

Plant annual, glandular-hairy, the stem hirsute-pubescent, the leaves, pedicels, and sepals with shorter gland-tipped hairs and also pilose with long glandless hairs, the stem diffusely ascending, 3–8 dm. tall, with slender horizontally spreading tortile branches that are bare except for a few small leaves near apex. Leaf-blades ovate, obtuse-rounded, reaching 2–2.5 cm. long, rounded to the very short petioles; inflorescence a foliose secund raceme, the pedicels becoming 2–3 mm. long; sepals dissimilar, the uppermost elliptic to ovate-oblong, rounded, 10–12 mm. long, the others lanceolate, attenuate, 8 mm. long; corolla 13–16 mm. long, presumably violet-purple, externally pilose, its basal pouch low, wider than deep, its upper lip ascending-erect, its lower lip longer, with large projecting densely puberulent to finely pubescent palate (closing orifice), from which depend the short lobes; capsule 6–7 mm. long, glandular-pubescent; seeds alveolate-reticulate.

Upper Sonoran Zone; Glenn County, perhaps also Calaveras County, central California. Type locality: "Stony Creek, Colusa [apparently now in Glenn] Co., California." June.

11. *Antirrhinum ovatum* Eastw. Oval-leaved Snapdragon. Fig. 4778.

Antirrhinum ovatum Eastw. Bull. Torrey Club 32: 213. 1905.

Plant annual, glandular-hairy, the stem hirsute-pubescent with glandless hairs among which are densely interspersed shorter gland-tipped ones, the pedicels, leaves, and sepals also glandular-pubescent, the stems ascending, 4 dm. tall, with ascending leafy floriferous branches. Leaf-blades rounded, those of the main stem oblong to oval, reaching 3 cm. long, narrowed to short petioles, but those of the branches ovate and truncate to very short petioles; inflorescence foliose, the pedicels 1–2 mm. long; sepals dissimilar, the uppermost elliptic-oval, rounded, becoming 15 mm. long, the others lanceolate, 5–7 mm. long; corolla 22–23 mm. long, purplish, externally hairy, its basal pouch prominent and forming a short spur 1.5 mm. deep, its upper lip ascending-recurved, pink, its lower lip longer, white, with glabrous palate (not closing orifice), from which depend the short lobes; anthers with yellow pollen; capsule 8 mm. long, glandular-hirsute.

Plains, Upper Sonoran Zone; San Luis Obispo County, California. Type locality: Carrizo Plain, San Luis Obispo County, California. June.

20. *DIGITALIS* [Bauhin] L. Sp. Pl. 621. 1753.

Erect perennial or biennial herbs, with alternate leaves and long racemes of flowers, each subtended by a small bract-leaf. Bracteoles none. Sepals 5, distinct. Corolla campanulate, with open orifice, the lobes only slightly distinguished, the lowermost longest. Filaments 4, didynamous, all antheriferous. Stigmas distinct, lamellate. Capsule ovoid, loculicidal. Seeds many, unwinged, reticulate. [Name Latin, meaning finger of a glove.]

A genus of about 30 species, all Palaearctic. Type species, *Digitalis purpurea* L.

1. *Digitalis purpurea* L. Purple Foxglove. Fig. 4779.

Digitalis purpurea L. Sp. Pl. 621. 1753.

Biennial, finely pubescent, distally glandular, the basal and lower leaf-blades large, oblong-lanceolate, acute, dentate, narrowed to slightly petioled bases, the flowering stems 12–18 dm. tall, many-flowered, with linear-lanceolate entire bracts, and pedicels becoming 20–25 mm. long. Sepals ovate, becoming 15–18 mm. long; corolla 40–50 mm. long, purple, on lower side pale with purple spots and mottlings; capsule 12 mm. long; seeds 0.5 mm. long.

Rocky coast, Humid Transition Zone; Vancouver Island south to northern California. Escaped from gardens. May–Sept.

21. *VERÓNICA* [Bauhin] L. Sp. Pl. 9. 1753.

Erect or repent perennial or annual herbs, with leaves opposite throughout or the upper bract-leaves alternate. Bracteoles none. Sepals 5 or 4, distinct. Corolla nearly rotate, cyanic, 4-lobed (by complete fusion of the upper pair). Stamens 2 (the postero-lateral pair). Stigmas united and slightly capitate. Capsule flattened, loculicidal. Seeds flattened, smooth or rarely roughened. [Presumably named in honor of St. Veronica.]

A genus of about 250 species, of the North Temperate Zone, especially in the Old World. Type species, *Veronica officinalis* L.

Main stem terminating in an inflorescence, its flowers either densely crowded or remote and axillary, the upper bract-leaves alternate. I. *VERONICELLA*.

Main stem never terminating in an inflorescence, the leaves opposite throughout and the flowers all in axillary racemes. II. *EUVERONICA*.

I. *VERONICELLA*.

Plant perennial from subterranean rhizomes; only the upper leaf-axils flower-bearing, so that inflorescence is formed of definite racemes.

Capsule as long as or longer than wide, shallowly or not notched; corolla violet-blue, rarely nearly white, internally glabrous; leaf-blades obtuse to acute; stems erect nearly or quite from base.

Style longer than the capsule; filaments equaling or exceeding the corolla; corolla 10–13 mm. wide; calyx-lobes unequal, the lower longer; leaf-blades entire.

Leaf-blades oblong-elliptic, hirsute-pubescent, acute; sepals 5, the uppermost much the smallest, the others slightly unequal; capsule scarcely notched. 1. *V. Copelandii*.

Leaf-blades elliptic-oval, glabrous or nearly so, obtuse to acutish; sepals 4, decidedly unequal; capsule clearly notched. 2. *V. Cusickii*.

Style shorter than the capsule; filaments shorter than the corolla; corolla 6–7 mm. wide; calyx-lobes equal in length; leaf-blades crenate-serrate to entire. 3. *V. Wormskjoldii*.

Capsule wider than long, deeply notched; corolla white or bluish, with deeper blue lines on upper side, its tube internally pubescent; style nearly as long as the capsule; leaf-blades obtuse, obscurely crenate; stems extensively repent, ascending at apex. 4. *V. serpyllifolia*.

Plant annual, fibrous-rooted; most leaf-axils flower-bearing, so that inflorescence is of axillary flowers.

Pedicels shorter than the lanceolate to linear sepals; capsule strongly flattened, its lobes rounded; seeds many; plants erect.

Corolla whitish throughout; capsule greenish, the minute style hidden between the short capsule-lobes; plant glabrous, or with gland-tipped hairs. 5. *V. peregrina*.

Corolla deep violet-blue; capsule yellowish brown, notched one-third its length or more, the longer style about equaling the capsule-lobes; plant pubescent with glandless or obscurely gland-tipped hairs. 6. *V. arvensis*.

Pedicels longer than the ovate sepals; capsule relatively turgid, its lobes acutish with the most distal point of each near its lateral margin; seeds few; stems repent. 7. *V. persica*.

II. *EUVERONICA*.

Plants pubescent; leaf-blades relatively wide, crenate-serrate to dentate; plants of dry soil.

Leaf-blades ovate, dentate, truncate or cordate to nearly or quite sessile bases; sepals 4–5 mm. long, exceeding the capsule; corolla 5–6 mm. long; pedicels longer than subtending bracts; stem ascending. 8. *V. Chamaedrys*.

Leaf-blades narrowly elliptic to oval, crenate-serrate, narrowed to petiolar bases; sepals 2–3 mm. long, shorter than the capsule; corolla 3–4 mm. long; pedicels shorter than subtending bracts; stem repent, erect at apex. 9. *V. officinalis*.

Plants glabrous or nearly so (occasionally hairy in *V. scutellata*); leaf-blades relatively narrow, finely serrate to entire; plants of wet soil or aquatic.

Capsule less than one and a half times as wide as long, scarcely or not two-lobed; sepals nearly or quite as long as the capsule; leaf-blades oblong-ovate to lanceolate, obtuse to acuminate, serrate to crenate-serrate.

Leaf-blades all petioled, lanceolate to ovate-lanceolate; racemes usually 10–25-flowered, the pedicels 5–13 mm. long. 10. *V. americana*.

Leaf-blades (at least the upper on the flowering stems) sessile and clasping, obtuse to acuminate; racemes 15–60-flowered, the pedicels 3–8 mm. long.

Capsule oval to elliptic, not or scarcely notched; leaf-blades lanceolate to ovate-lanceolate, serrate with close teeth (4 or more to 1 cm.), those of the young autumnal shoots petioled; plants chiefly or wholly emersed. 11. *V. Anagallis-aquatica*.

Capsule obviously wider than long, evidently notched; leaf-blades oblong-lanceolate, crenate-serrate with remote teeth, all clasping; plants largely submersed. 12. *V. connata*.

Capsule more than twice as wide as long, strongly 2-lobed; sepals shorter than the capsule; racemes 5-20-flowered, the filiform pedicels 6-17 mm. long; leaf-blades linear or linear-lanceolate, remotely setaceous-toothed or entire. 13. *V. scutellata*.

1. *Veronica Copelandii* Eastw. Copeland's Speedwell. Fig. 4780.

Veronica Copelandii Eastw. Bot. Gaz. 41: 288. fig. 2. 1906.

Perennial, with spreading suffrutescent stems, those of the season erect, 0.6-1.2 dm. tall, the herbage softly pilose with some or all of the hairs gland-tipped. Leaf-blades oblong-elliptic, acute or rounded at apex, entire, sessile; flowers in a terminal small-bracted raceme, the pedicels becoming 6-8 mm. long; sepals 5, elliptic, 2.5 mm. long, the uppermost smaller; corolla 10 mm. wide; filaments 4-5 mm. long; style 7 mm. long; capsule longer than wide, shallowly notched.

Hudsonian and Arctic-Alpine Zones; Scott Mountains, northern California. Type locality: Mount Eddy, California. August.

2. *Veronica Cusickii* A. Gray. Cusick's or Ornamental Speedwell. Fig. 4781.

Veronica Cusickii A. Gray, Syn. Fl. N. Amer. 2¹: 288. 1878.

Veronica Allenii Greenm. Bot. Gaz. 25: 263. 1898.

Veronica Cusickii var. *Allenii* Macbride & Payson, Contr. Gray Herb. No. 49: 67. 1917.

Perennial, with spreading suffrutescent stems, those of the season erect, 1-1.5 dm. tall, the stems, pedicels, and sepals finely glandular-pubescent. Leaf-blades elliptic-oval, obtuse to acutish, entire, glabrous, sessile; flowers in terminal small-bracted racemes, the pedicels becoming 3-9 mm. long; sepals 4, narrowly ovate, acute to obtuse, 3 mm. long; corolla 10-13 mm. wide, deep blue-violet; filaments 4-5 mm. long; style 6-9 mm. long; capsule 5-6 mm. long, little longer than wide, deeply notched, finely glandular-pubescent.

Gravelly soil, openings in coniferous forest and on alpine meadows, Hudsonian and Arctic-Alpine Zones; Olympic Mountains and Cascade Range of Washington, and Cascade Range, Blue, and Wallowa Mountains of Oregon, and south in the Sierra Nevada to Tuolumne County, California. Type locality: Blue Mountains, Oregon. July-Aug.

3. *Veronica Wormskjöldii* Roem. & Sch. American Alpine Speedwell. Fig. 4782.

Veronica Wormskjöldii Roem. & Sch. Syst. Veg. 1: 101. 1817.

Perennial, with slender subaerial rhizomes, the stems of the season erect, 1-3 dm. tall, the stem and leaves loosely pilose but the inflorescence glandular-pubescent. Leaf-blades oval, obtuse or rounded, dentate with low teeth to entire, rounded to sessile bases; flowers in terminal small-bracted racemes, the pedicels becoming 2-5 mm. long; sepals 4, oblanceolate, obtuse, 4 mm. long; corolla 6-7 mm. wide, blue-violet; filaments 1 mm. long; style 1-2 mm. long; capsule 5-7 mm. long, oval, widely retuse; seeds 1 mm. long.

Alpine meadows, Arctic-Alpine Zone; Alaska to Greenland, south to Oregon, Wyoming, and New Hampshire. Type locality: Greenland. June-Aug.

Veronica Wormskjöldii subsp. *alterniflora* (Fernald) Pennell. (*Veronica alpina* var. *alterniflora* Fernald, Rhodora 41: 455. pl. 567. 1939; *V. alpina* var. *cascadensis* Fernald, op. cit. 456. pl. 568.) Inflorescence more slender, the fruits usually becoming somewhat isolated (instead of contiguous or overlapping). Alpine meadows, Arctic-Alpine Zone; Alaska to California and Utah. Type locality: Cape Horn, Custer County, Idaho. June-Aug.

4. *Veronica serpyllifolia* L. Thyme-leaved Speedwell. Fig. 4783.

Veronica serpyllifolia L. Sp. Pl. 12. 1753.

Perennial, with slender subaerial rhizomes, the stems of the season repent with the distal portion erect and fruit-bearing, altogether 1-2 dm. long, with fine appressed hairs on the stem and pedicels. Leaf-blades ovate-oblong or oval, crenate to entire, rounded to sessile or the lower to shortly petioled bases; flowers in terminal small-bracted racemes, the pedicels becoming 4-5 mm. long; sepals 4, elliptic-oblong, obtuse, 3-4 mm. long; corolla 4-5 mm. wide, pale or white, the upper lobes with violet lines; filaments 1 mm. long; style 1.5-2 mm. long; capsule 3 mm. long, widely obcordate (4 mm. wide), finely glandular-pubescent; seeds 0.5 mm. long.

Moist pasture land, at least in western Oregon. Naturalized from Eurasia. April-June.

Veronica serpyllifolia var. *humifusa* (Dickson) Vahl, Enum. 1: 65. 1805. (*Veronica humifusa* Dickson, Trans. Linn. Soc. 2: 288. 1794; *V. funesta* Macbride & Payson, Contr. Gray Herb. No. 49: 68. 1917.) Pedicels and stems distally with longer mostly spreading hairs; plant usually larger, the corolla wider, pale violet, and the capsule mostly 4-5 mm. long. Moist soil, often in pastures, Transition and Hudsonian Zones; Alaska to Newfoundland, south to San Bernardino Mountains of southern California, Arizona, New Mexico, and Maine; also in South America and Eurasia. Type locality: Scotland. April-July.

5. *Veronica peregrina* L. Purslane Speedwell. Fig. 4784.

Veronica peregrina L. Sp. Pl. 14. 1753.

Annual, erect, 1.5-3 dm. tall, glabrous throughout. Leaf-blades linear-oblong, obtuse, dentate to entire, sessile or the lower somewhat petioled; flowers in spiciform leafy-bracted terminal racemes, the pedicels only 1-2 mm. long; sepals 4, linear-oblong or oblanceolate, obtuse, 3 mm.



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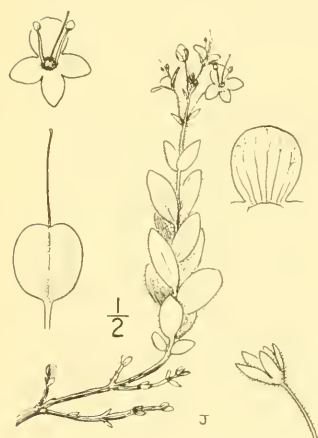
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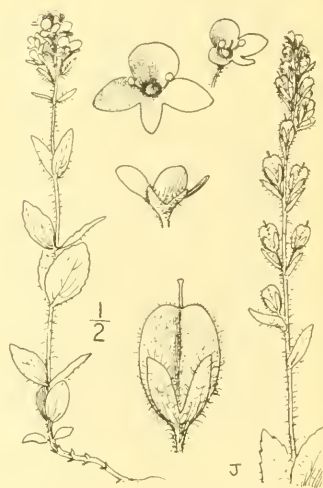
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4774. *Antirrhinum vexillo-calculatum*
 4775. *Antirrhinum Kingii*
 4776. *Antirrhinum Nuttallianum*

4777. *Antirrhinum subcordatum*
 4778. *Antirrhinum ovatum*
 4779. *Digitalis purpurea*

4780. *Veronica Copelandii*
 4781. *Veronica Cusickii*
 4782. *Veronica Wormskjoldii*



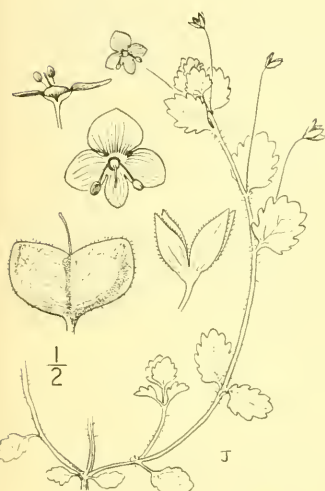
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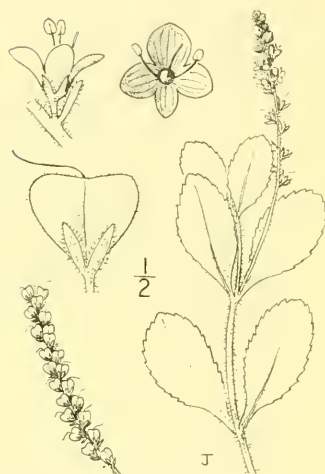
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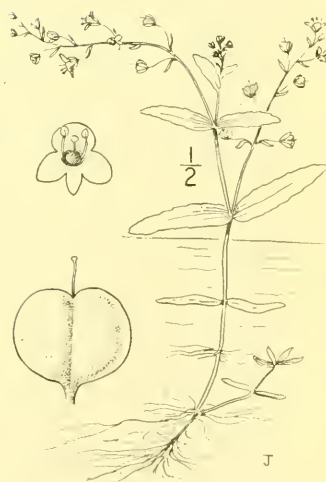
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4783. *Veronica serpyllifolia*
 4784. *Veronica peregrina*
 4785. *Veronica arvensis*

4786. *Veronica persica*
 4787. *Veronica Chamaedrys*
 4788. *Veronica officinalis*

4789. *Veronica americana*
 4790. *Veronica Anagallis-aquatica*
 4791. *Veronica connata*

long; corolla 2–2.5 mm. wide, white; filaments very short; style 0.2–0.3 mm. long; capsule 3–3.5 mm. long; seeds 0.5 mm. long.

Moist ground, Transition Zones; occasional in coastal Washington and Oregon, probably naturalized from eastern North America. Type locality: Europe (as adventive). May–June.

Veronica peregrina subsp. *xalapensis* (H. B. K.) Pennell, *Torreya* 19: 167. 1919. (*Veronica xalapensis* H. B. K., *Nov. Gen. & Sp.* 2: 389. 1818; *V. Sherwoodii* Peck, *Torreya* 28: 56. 1928.) Plant pubescent with short gland-tipped hairs, which are usually present even on the capsule. Muddy soil, streamsides and pools, Upper Sonoran and Transition Zones; over western North America from western Canada to Mexico, also in the St. Lawrence Valley and southward to South America. Type locality: Jalapa ("Xalapa"), Mexico. March–July.

6. *Veronica arvensis* L. Corn Speedwell. Fig. 4785.

Veronica arvensis L. Sp. Pl. 13. 1753.

Annual, erect or ascending, 1–3 dm. long, pilose with glandless hairs. Leaf-blades ovate, rounded-obtuse, crenate-dentate, rounded to short petioles or the uppermost sessile; flowers in spiciform leafy-bracted terminal racemes, the pedicels only 1–2 mm. long; sepals 4, linear-lanceolate, acutish, 3.5–4 mm. long, the lower pair slightly the longer; corolla 2–2.5 mm. wide, bright violet-blue; filaments short; style 0.7 mm. long; capsule 2–2.5 mm. long, rounded, deeply obcordate, its lobes flaring, ciliate-pubescent; seeds 1 mm. long.

Fields, somewhat naturalized from Europe. April–July.

7. *Veronica persica* Poir. Persian Speedwell. Fig. 4786.

Veronica persica Poir. *Encycl.* 8: 542. 1808.

Annual, ascending, 2–4 dm. tall, pilose with glandless hairs. Leaves scattered or alternate, the blades ovate, obtuse, dentate with rounded lobes, truncate to petioles shorter than the blades; flowers in lax leafy-bracted terminal racemes, the pedicels becoming 20–35 mm. long; sepals 4, elliptic-ovate, obtuse, short-ciliate, 5 mm. long; corolla 7–11 mm. wide, violet-blue, pale ventrally, all lobes darker-veined; filaments 2 mm. long; style 2 mm. long; capsule 2.5–3 mm. long, widely notched, the rectangular lobes widely flaring; seeds 1.5 mm. long.

Waste ground and lawns, somewhat naturalized from Eurasia. Feb.–May.

8. *Veronica Chamaedrys* L. Germander Speedwell. Fig. 4787.

Veronica Chamaedrys L. Sp. Pl. 13. 1753.

Perennial, ascending, 2–4 dm. tall, pubescent with glandless hairs. Leaves opposite, the blades ovate, obtuse, dentate with rounded lobes, rounded to sessile or the lower to petioled bases; flowers in long minutely bracted axillary racemes, the pedicels 6–7 mm. long; sepals 4, linear-lanceolate, pubescent or ciliate, 3–4 mm. long; corolla 10–12 mm. wide, light violet-blue; filaments 3 mm. long; style 4–5 mm. long; capsule 3.5 mm. long, triangular-obcordate, its lobes rounded.

Occasional in lawns of western Oregon. Naturalized from Europe. May.

9. *Veronica officinalis* L. Official Speedwell. Fig. 4788.

Veronica officinalis L. Sp. Pl. 11. 1753.

Perennial, repent and distally ascending, 3–6 dm. long, pubescent with glandless hairs. Leaves opposite, the blades oval, acute or acutish, crenate-serrate, narrowed to shortly petioled bases; flowers in spike-like small-bracted axillary racemes, the pedicels 1–1.5 mm. long; sepals 4, oblong-lanceolate, acute, 3 mm. long; corolla 6–8 mm. wide, lined or tinted with lavender-violet; filaments 2 mm. long; style 3 mm. long; capsule 4 mm. long, obovate, shallowly retuse; seeds 1 mm. long.

Occasional in fields of western Washington and western Oregon; naturalized from Europe. July.

Veronica officinalis var. *Tournefortii* (Vill.) Reichb. & G. F. Reichenb. *Icon. Fl. Germ.* 20: 49. pl. 1706. 1862. (*Veronica Tournefortii* Vill. *Hist. Pl. Dauph.* 20. 1779.) Plants smaller, the leaf-blades narrowly elliptic, more acute, the larger 1–1.5 cm. (rather than 2–3 cm.) long. Fields, western Oregon; naturalized from Europe. June.

10. *Veronica americana* (Raf.) Schwein. American Brooklime. Fig. 4789.

Veronica Beccabunga var. *americana* Raf. *Med. Fl.* 109. 1830.

Veronica americana Schwein. ex Benth. in A. DC. *Prod.* 10: 468. 1846.

Perennial, glabrous throughout, at base rhizomatose and repent, the main stems ascending or erect, 1–10 dm. long. Leaves opposite, the blades lanceolate to ovate-lanceolate, acute or acutish, serrate with low teeth to merely denticulate, rounded to short petioles; flowers in loose small-bracted axillary racemes, which are usually 10–25-flowered, the pedicels 5–13 mm. long; sepals 4, oblong-lanceolate, acute, 3 mm. long; corolla 7–10 mm. wide, violet-blue, with somewhat darker lines; filaments 2.5–3 mm. long; style 2.5–3 mm. long; capsule 3–4 mm. long, oval, acutish or rounded; seeds 0.5 mm. long.

Stream sides and swamps, Transition Zone to Canadian Zone; Alaska to southern California, eastward to New Mexico, North Carolina, and Newfoundland; also in Mexico and northeastern Asia. Type locality: eastern North America. May–Aug.

11. *Veronica Anagallis-aquatica* L. Great Water Speedwell. Fig. 4790.

Veronica Anagallis-aquatica L. Sp. Pl. 12. 1753.

Probably biennial, glabrous throughout or obscurely glandular-puberulent in the inflorescence,

the stems ascending or erect, 4–10 dm. long. Leaves opposite, the blades oblong-lanceolate, acute, serrate to merely denticulate, rounded to clasping bases, but those of autumnal shoots smaller and rounded, proximally narrowed to petioled bases; flowers in small-bracted axillary racemes, which are usually many-flowered, the pedicels 6–8 mm. long; sepals 4, lanceolate, acute, 4–4.5 mm. long; corolla 5 mm. wide, pale lavender, the lobes with violet lines; style 1.8–2.5 mm. long; capsule 4 mm. long, ovate, obtuse at the narrowed but scarcely or not notched apex; seeds 0.5 mm. long.

Stream banks and irrigation ditches, occasionally naturalized from Europe. June–Aug.

12. *Veronica connata* subsp. *glaberrima* Pennell. Broad-fruited Water Speedwell. Fig. 4791.

Veronica catenata Pennell, *Rhodora* 23: 37. 1921.

Veronica connata subsp. *glaberrima* Pennell, *Monog. Acad. Phila.* 1: 368. 1935.

Probably biennial, glabrous throughout, the stems submersed or distally rising above the water. Leaves opposite, the blades oblong-lanceolate, acute or acutish, crenate-serrate with low and relatively remote teeth, those of the lateral shoots smaller but essentially similar; flowers in small-bracted many-flowered racemes, the pedicels 4–6 mm. long; sepals 4, oblong or nearly so, obtuse, 4 mm. long; corolla 5 mm. wide, white, the lobes proximally with wide purple lines; filaments 1.5 mm. long; style 2 mm. long; capsules 2.5–3 mm. long, obcordately notched between the divaricate rounded cells (3.5–4 mm. wide); seeds 0.3–0.4 mm. long.

Slow-flowing streams and ditches, Upper Sonoran and Transition Zones; occasional within our territory, occurring from Washington and Manitoba, south to southern California, New Mexico, and Missouri. Type locality: Hot Springs, South Dakota. July–Sept.

13. *Veronica scutellata* L. Marsh or Grass-leaved Speedwell. Fig. 4792.

Veronica scutellata L. *Sp. Pl.* 12. 1753.

Perennial, glabrous throughout [except in the rare and sporadic forma *villosa* (Schum.) Pennell, *Rhodora* 23: 38. 1921], rhizomatose at base, the slender stems 1–6 dm. tall. Leaves opposite, the blades linear to linear-lanceolate, remotely setaceous-toothed or entire; flowers in lax small-bracted axillary racemes, which are usually 5–20-flowered, the pedicels 6–17 mm. long; sepals 4, oblong, acute, 3 mm. long; filaments 2.5 mm. long; style 2–4 mm. long; capsule 3–4 mm. long, deeply obcordate between the divaricate rounded cells (4–5 mm. wide).

Marshes, swales, and ditches, Transition Zones; British Columbia to central California, east to New England; also in Eurasia. May–Aug.

22. *SYNTHYRIS* Benth. in A. DC. *Prod.* 10: 454. 1846.

Perennial glandless herbs, with radical petioled leaves and erect flowering stems that bear distally racemes of blue or violet-blue flowers. Bracteoles none. Sepals 4, distinct. Corolla campanulate to rotate, 4-lobed (by complete fusion of the upper pair of petals), its upper lip plane, the lower lobes parted to the tube. Stamens 2 (the postero-lateral pair). Stigmas united, minutely capitate. Capsule flattened, loculicidal. Seeds flattened or with incurved margins, many or few. [Name Greek, meaning closed doors, referring to the capsule-valves.]

A genus of 14 species, of western North America. Type species, *Wulfenia reniformis* Dougl.

Seeds dull brown, with thick incurved margins, only 2 to a capsule-cell; capsule hirsute, much wider than long; corolla campanulate, its lobes shorter than the tube; sepals ciliate; fruiting pedicels exceeding their subtending bracts, the racemes spreading or deflexing in fruit; leaf-blades crenate or crenately dentate, cordate at base.

I. *PLAGIOCARPUS*.

Seeds yellowish brown, with thin flat margins, several or many to each capsule-cell; capsule glabrous at maturity; corolla tubular-rotate, the lobes spreading widely; sepals not long-ciliate; fruiting pedicels about equaling or usually shorter than the bracts (except in *S. schizantha*); racemes permanently erect.

II. *EUSYNTHYRIS*.

I. *PLAGIOCARPUS*.

Only species.

1. *S. reniformis*.

II. *EUSYNTHYRIS*.

Leaf-blades palmately veined, orbicular-cordate to reniform, doubly toothed or lobed (incisions less than one-fourth the depth of blade), with acute or rounded teeth; plants glabrous or finely pubescent.

Corolla-lobes laciniately incised; capsule much wider than long, each cell nearly circular; sepals linear-attenuate.

2. *S. schizantha*.

Corolla-lobes entire or slightly erose; capsule no wider than long, each cell elongated; sepals oblong-lanceolate to oval.

Teeth of leaf-blades acuminate-cuspidate; bracts nearly oval, relatively conspicuous, as are also the 2 or 3 pairs of pectinate bract-like leaves below the inflorescence; capsule 7–8 mm. wide, the truncate apex widely notched.

3. *S. stellata*.

Teeth of leaf-blades acute or obtuse; bracts nearly elliptic, less evident; bract-like leaves below inflorescence usually fewer and less cut; capsule 5–6 mm. wide, the apex more narrowly notched.

4. *S. missurica*.

Leaf-blades bipinnatifid, the 9–15 primary segments deeply parted into lanceolate or linear-attenuate lobules; stem and leaves lanose-canescens with soft white hairs.

5. *S. lanuginosa*.

1. *Synthyris reniformis* (Dougl.) Benth. Snow-Queen or Round-leaved Synthyris. Fig. 4793.

Wulfenia reniformis Dougl. ex Benth. Scroph. Indicae 46. 1835.

Synthyris reniformis Benth. in A. DC. Prod. 10: 454. 1846.

Synthyris rotundifolia A. Gray, Syn. Fl. N. Amer. 2: 285. 1878.

Pilose, becoming hirsute-pubescent on distal portion of stems and on pedicels and capsules, the sepals ciliate with similar slender hairs. Leaf-blades cordate-orbicular, with about 7 pairs of crenately dentate shallow lobes, the paler lower surface with short hairs or glabrescent; flowering stems about equaling the leaves; racemes 1–3 cm. long, the pedicels 7–10 mm. long, more than twice as long as the ovate bracts; sepals oval, becoming 4–4.5 mm. long; corolla 6–9 mm. long, campanulate, its lobes shorter than the tube; filaments 3–4 mm. long; style 5–8 mm. long; capsule 2–4 mm. long, with widely divaricate cells (altogether 7–8 mm. wide); seeds with incurved thick margins.

Rich coniferous forest, Humid Transition Zone; Pacific Slope in Washington and Oregon. Type locality: Columbia River. March–May.

Synthyris reniformis var. *cordata* A. Gray, Bot. Calif. 1: 571. 1876. (*Synthyris rotundifolia* var. *cordata* A. Gray, Syn. Fl. N. Amer. 2: 285. 1878; *S. rotundifolia* var. *Sweetseri* Henderson, Rhodora 32: 27. 1930.) Leaf-blades longer than wide, ovate-cordate and often more lobed, firmer and more glabrescent. Moist forest, Humid Transition Zone; southern coastal Oregon and northern coastal California, south to Marin County. March–May.

2. *Synthyris schizantha* Piper. Fringed Synthyris. Fig. 4794.

Synthyris schizantha Piper, Bull. Torrey Club 29: 223. 1902.

Finely pubescent on petioles and ribs of lower leaf-surface, and on flowering stems and pedicels, elsewhere glabrous. Leaf-blades cordate-orbicular or reniform, with about 9–11 pairs of doubly dentate-lobed lobes (cut about one-sixth depth of blade), the lower surface slightly paler; flowering stems exceeding the foliage, with a pair of foliose sessile bracts below inflorescence, the raceme 6–9 cm. long, with pedicels 5–6 mm. long and about equaling the oblong-lanceolate to linear bracts; sepals linear, 4 mm. long; corolla 8–11 mm. wide, nearly rotate, the laciniately cleft lobes longer than the tube; filaments 4–5 mm. long; style 6–7 mm. long; capsule 2.5–3 mm. long, with widely divaricate rounded cells (altogether 6 mm. wide); seeds somewhat flattened.

Moist banks or bluffs, Canadian Zone; coastal mountains and outlying slopes of Cascade Range in Washington, and on Saddle Mountain in the Coast Range of northwestern Oregon. Type locality: Baldy Peak, Olympic Mountains, Washington. June–July.

3. *Synthyris stellata* Pennell. Columbia Synthyris. Fig. 4795.

Synthyris stellata Pennell, Proc. Acad. Phila. 85: 89. 1933.

Finely villous-pubescent on rachis and pedicels of inflorescence, elsewhere glabrous. Leaf-blades cordate-orbicular, with about 9 pairs of doubly and saliently dentate-toothed lobes (cut about one-sixth the depth of blade), the lower surface scarcely paler; flowering stems exceeding the foliage, with one or several pairs of pectinate and nearly sessile foliose bracts below inflorescence; racemes 8–15 cm. long, with pedicels 5–10 mm. long and about equaling the usually oblanceolate bracts; sepals oblong, 4–5 mm. long; corolla about 10 mm. wide, nearly rotate, the rounded slightly erose lobes longer than the tube; filaments 5–6 mm. long; style 5–7 mm. long; capsule 6 mm. long, truncate or barely retuse, 7–8 mm. wide; seeds flat.

Mossy rocky slopes, Humid Transition Zone; within and on hills adjoining the Columbia River Gorge through the Cascade Range, Washington and Oregon. Type locality: near Oneonta Tunnel, Columbia River Gorge, Oregon. April–May.

4. *Synthyris missurica* (Raf.) Pennell. Lewis and Clark's Synthyris. Fig. 4796.

Veronica reniformis Pursh, Fl. Amer. Sept. 1: 10. 1814. Not *V. reniformis* Raf. 1808.

Veronica missurica Raf. Amer. Month. Mag. 3: 175. 1818.

Veronica Purshii G. Don, Gen. Hist. Pl. 4: 573. 1838.

Synthyris missurica Pennell, Proc. Acad. Phila. 85: 89. 1933.

Glabrous throughout or the rachis and pedicels of the inflorescence brownish-puberulent. Leaf-blades cordate-orbicular, with about 7–9 pairs of doubly dentate-lobed and -toothed lobes (cut about one-sixth the depth of blade), the lower surface scarcely paler; flowering stems exceeding the foliage, with several scattered small bracts below inflorescence; raceme becoming 6–18 cm. long, with pedicels 3–6 mm. long, about equaling or shorter than the usually oblanceolate bracts; sepals linear to nearly oblong, 3–4 mm. long; corolla 6–7 mm. wide, nearly rotate, with rounded slightly erose lobes longer than the tube; filaments 3.5–4 mm. long; style 4–5 mm. long; capsule 5 mm. long, distally notched, 5–6 mm. wide; seeds flat.

Moist rocky cliffs to open alpine summits, Canadian Zone to Arctic-Alpine Zone; northeastern Washington and northern Idaho south to Modoc County, northeastern California and south central Idaho. May–July.

Synthyris missurica subsp. *major* (Hook.) Pennell, Proc. Acad. Phila. 85: 91. 1933. (*Synthyris reniformis* var. *major* Hook. Kew Journ. Bot. 5: 257. 1853; *Wulfenia major* Heller, Cat. N. Amer. Pl. 7. 1898; *S. major* Heller, Muhlenbergia 1: 5. 1900.) Plant larger, the fruiting stems 3–5 dm. tall with rachis and pedicels bearing whitish appressed hairs, and the corollas deflexed-crowded (rather than ascending-spreading). Moist buttes and low mountains, Transition Zones; lower Snake River Valley in southeastern Washington and adjacent Idaho. Type locality: "highlands of Nez Perce," western Idaho. April–May.

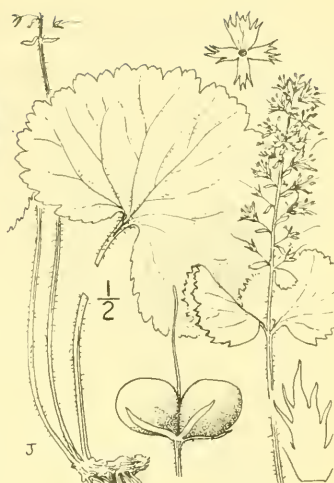
Synthyris missurica subsp. *hirsuta* Pennell, Proc. Acad. Phila. 85: 91. 1933. Pedicels and rachis hirsute-pubescent with brown hairs. Presumably from the Cascade Range of western Oregon. Type locality: Oakland, Oregon. April.



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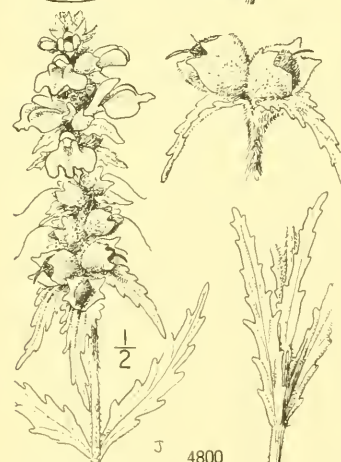
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4792. *Veronica scutellata*
 4793. *Synthyris reniformis*
 4794. *Synthyris schizantha*

4795. *Synthyris stellata*
 4796. *Synthyris missurica*
 4797. *Synthyris lanuginosa*

4798. *Besseyia rubra*
 4799. *Parentucellia viscosa*
 4800. *Bellardia Trixago*

5. *Synthyris lanuginosa* (Piper) Pennell & Thompson. Woolly *Synthyris*. Fig. 4797.

Synthyris pinnatifida subsp. *lanuginosa* Piper, Contr. U.S. Nat. Herb. 11: 504. 1906.
Synthyris lanuginosa Pennell & Thompson, Proc. Acad. Phila. 85: 93. 1933.

Lanuginous-canescens throughout, even upon the capsule, but the sepals glabrescent. Leaf-blades bi- to tri-pinnatifid, the mid-portion linear, the primary segments about 4 pairs, each with 1 or 2 pairs of segments which are again toothed, or these sometimes more irregularly developed, the ultimate segments acuminate and tending to be callose; flowering stems exceeding the foliage, scape or with a few small bracts below inflorescence, the spiciform raceme 1-5 cm. long, with pedicels 1-3 mm. long, much shorter than the ovate or oblanceolate bracts; sepals oblong-lanceolate, 4 mm. long; corolla 5-6 mm. wide, nearly rotate, the narrow entire lobes longer than the tube; filaments 4 mm. long; style 4-5 mm. long; capsule 4-5 mm. long, obcordately notched, 4 mm. wide; seeds flat.

Gravelly alpine summits, Arctic-Alpine Zone; Olympic Mountains of western Washington. Type locality: Olympic Mountains, Washington. June.

23. *BÉSSEYA* Rydb. Bull. Torrey Club 30: 279. 1903.

Perennial glandless herbs, with radical cordate-ovate leaf-blades and erect flowering stems that bear proximally several to many bracts on the spiciform inflorescence. Bracteoles none. Sepals 4 (in ours), united laterally near base. Corolla (in ours) lacking. Stamens 2 (the upper pair). Stigmas united, minutely capitate. Capsule flattened, loculicidal. Seeds numerous, flattened. [Named in honor of Charles E. Bessey, American botanist.]

Species 9, of the western United States and the Great Lakes Region. Type species, *Synthyris alpina* A. Gray.

1. *Besseyia rubra* (Dougl.) Rydb. Red Besseyia. Fig. 4798.

Gymnandra rubra Dougl. ex Hook. Fl. Bor. Amer. 2: 103. 1838.
Synthyris rubra Benth. in A. DC. Prod. 10: 455. 1846.
Wulfenia rubra Greene, Erythea 2: 83. 1894.
Besseyia rubra Rydb. Bull. Torrey Club 30: 280. 1903.
Lunellia rubra Nieuwl. Amer. Midl. Nat. 3: 189. 1914.

Plant loosely hairy, but the leaves becoming glabrescent, the inflorescence villulose in anthesis with the capsule short-pubescent and in age glabrescent. Leaf-blades crenate-dentate, paler beneath, truncate or slightly cordate at base; flowering stems exceeding the foliage, proximally with about 10 small bract-leaves, the distal spike-like raceme becoming 10-20 cm. long, its lowest pedicels 2-3 mm. but most pedicels less than 1 mm. long; sepals 3-4 mm. long, oblong, rounded; filaments 4-5 mm. long, dark red; style 4-5 mm. long; capsule 5-6 mm. long, rounded, 6-7 mm. wide.

Sandy or rocky prairie or open woodland, Arid Transition Zone; eastern Washington and eastern Oregon to western Montana and southwestern Idaho. Type locality: northwestern Montana. April-May.

24. *PARENTUCÉLLIA* Viviani, Fl. Libyc. Spec. 31. 1824.

Erect annual or biennial hairy herbs, with opposite leaves and a spike-like raceme of flowers. Bracteoles none. Calyx with 4 lanceolate lobes. Corolla 2-lipped, its upper lip galeate, with lobes united to apex, its lower lip with 2-ridged palate and with short spreading lobes. Stamens 4, didynamous, the anthers lanose, with cells equivalent and mucronate-tipped. Capsule cylindric, acute, loculicidal, the upper cell slightly the larger. Seeds ellipsoid-oblong, smooth. [Named in honor of Tomaso Parentucelli, founder of the botanic garden at Rome.]

Two species, of the Mediterranean Region, the following naturalized in western North America and in southern South America. Type species, *Parentucellia floribunda* Viviani, of Libya.

1. *Parentucellia viscosa* (L.) Caruel. Yellow Parentucellia. Fig. 4799.

Bartsia viscosa L. Sp. Pl. 602. 1753.
Parentucellia viscosa Caruel in Parl. Fl. Ital. 6: 482. 1885.

Plant glandular-pubescent throughout (except between ribs on lower leaf-surface), the stem 3-5 dm. tall. Leaf-blades saliently dentate, rounded to sessile bases; pedicels less than 2 mm. long; corolla 16-17 mm. long, yellow; capsule 8 mm. long, distally brown-hirsute; seeds 0.3 mm. long.

Moist waysides, near the coast, Oregon and northern California. April-July.

25. *BELLÁRDIA* All. Fl. Ped. 1: 61. 1785.

Erect annual hairy herbs, with opposite leaves and a spike-like raceme of purple flowers. Bracteoles none. Calyx with 4 short lobes. Corolla 2-lipped, its upper lip galeate, with lobes united to apex, its lower lip with 2-ridged palate and with short spreading



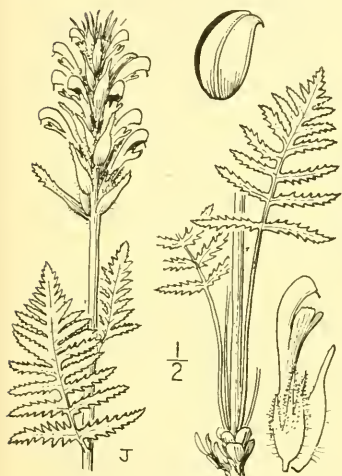
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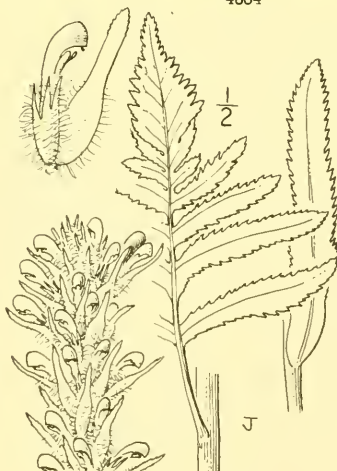
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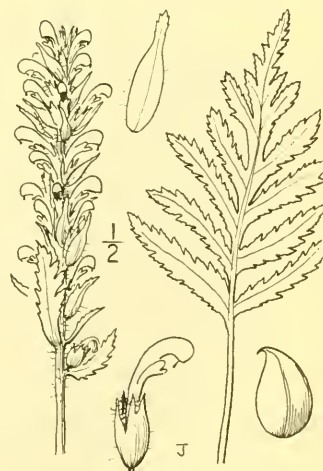
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4801. *Rhinanthus borealis*
 4802. *Pedicularis centranthera*
 4803. *Pedicularis semibarbata*

4804. *Pedicularis densiflora*
 4805. *Pedicularis atrosanguinea*
 4806. *Pedicularis bracteosa*

4807. *Pedicularis padoensis*
 4808. *Pedicularis pachyrhiza*
 4809. *Pedicularis Thompsonii*

lobes. Stamens 4, didynamous, the anthers short-pubescent, with cells all equivalent and mucronate-tipped. Capsule ovoid, mucronate, hirsute, loculicidal. Seeds irregularly ovoid, white-lined. [Named in honor of C. A. L. Bellardi, professor of botany in Turin University.]

A genus of 2 species, of the Mediterranean Region, the following naturalized in western North America and southern South America. Type species, *Bartsia Trirago* L.

1. *Bellardia Trirago* (L.) All. *Bellardia*. Fig. 4800.

Bartsia Trirago L. Sp. Pl. 602. 1753.

Bellardia Trirago All. Fl. Ped. 1: 61. 1785.

Plant pubescent with stiff hairs, in inflorescence with some hairs gland-tipped, the stem 3-5 dm. tall. Leaves lanceolate, coarsely dentate-lobed, narrowed to sessile bases; pedicels very short; calyx 8-9 mm. long, its obtuse lobes 1-1.5 mm. long, the lower slightly the shorter; corolla 18 mm. long, pale purple, its lower lip white; capsule 7 mm. long; seeds 0.4 mm. long.

Grassy waysides and fields; central California. Introduced from Europe. April-May.

26. *RHINANTHUS* L. Sp. Pl. 603. 1753.

Erect annual glandless herbs, with opposite leaves and a spike-like raceme of yellow flowers. Bracteoles none. Calyx inflated and venose, with 4 lobes. Corolla 2-lipped, the upper galeate (its lobes united to apex) but on lower side of apex with appendages of thin tissue, the lower lip shorter, with lobes spreading distally. Stamens 4, didynamous, the anthers proximally bearded, the cells all equivalent and acute. Capsule circular, strongly flattened, glabrous, loculicidal. Seeds many, flattened, circularly winged. [Name Greek, meaning nose flower.]

Some 50 species, of the cooler parts of the Northern Hemisphere, especially in Europe. Type species, *Rhinanthus Cristagalli* L.

1. *Rhinanthus borealis* (Stern.) Chab. Yellow Rattle. Fig. 4801.

Alectorolophus borealis Stern. Ann. Conserv. & Jard. Bot. Genève 3: 25. 1899.

Rhinanthus borealis Chab. Bull. Herb. Boiss. 7: 429. (June) 1899.

Alectorolophus arcticus Stern. Abh. Zool. Bot. Gesellsch. Wien 12: 114. 1901.

Alectorolophus pacificus Stern. op. cit. 120.

Stem 2-8 dm. tall, slightly bifariously pubescent. Leaves lanceolate, acute, dentate, finely appressed-pubescent, rounded to sessile bases; pedicels 2-3 mm. long; calyx 13-15 mm. long, finely pubescent, its lobes acute, 3 mm. long; corolla 8-11 mm. long, the appendages of the galea narrow and yellow; capsule 8 mm. long, slightly wider than long; seeds 3 mm. wide.

Open ground, Humid Transition Zone; along the coast from the Aleutian Islands to Tillamook County, Oregon. Type locality: Unalaska Island, Alaska. Early summer.

Rhinanthus borealis subsp. *Kyrollae* (Chab.) Pennell. (*Rhinanthus Kyrollae* Chab. Bull. Herb. Boiss. 7: 511. (July) 1899; *R. rigidus* Chab. op. cit. 516. (July) 1899.) Fruiting calyx glabrous or scarcely pubescent on sides. Grassy places, Transition Zone to Hudsonian Zone; Alaska to Labrador, south to the Columbia River; also Colorado and northern New York; rare in our area. Type locality: Annapolis, evidently not "United States," but likely Nova Scotia. Summer.

27. *PEDICULARIS* [Bauhin] L. Sp. Pl. 607. 1753.

Erect perennial herbs, with (in ours) alternate leaves and a usually spike-like raceme of yellow, purple, red or white flowers. Bracteoles none. Calyx with 5, 4, or seemingly 2 lobes. Corolla 2-lipped, its upper lip galeate and often extended into a beak-like process, its lower lip shorter and with the oblique lobes spreading or appressed. Stamens 4, didynamous; anthers glabrous, their cells equivalent, obtuse to subulate-tipped. Capsule flattened, glabrous, loculicidal. Seeds several, turgid, often slightly winged. [Name Latin, pertaining to lice, because of supposition that, if eaten by stock, lice would ensue.]

A genus of some 500 species of the North Temperate Zone, especially in the Old World; in the New World extending south to the Andes of Ecuador. Type species, *Pedicularis sylvatica* L.

Calyx-lobes 5, or rarely (by suppression of the uppermost one) 4, all distinct distally; leaf-blades deeply pinnatifid or bipinnatifid.

Segments of the leaf-blades sharply toothed; bracts at least one and a half times as long as wide, narrowed or rounded at base, the inflorescence slenderly elongated (except in *P. Dudleyi*).

Anther-cells subulate-tipped; stem less than 1 dm. tall, much exceeded by the lower leaves.

I. CENTRANTHERAE.

Anther-cells acute to obtuse; capsule dehiscent mainly or wholly on the dorsal side; stems over 1 dm. tall.

Corolla purple-red, club-shaped, the cylindric and distally rounded galea more than thrice as long as the inconspicuous appressed lower lip; anther-cells acute; lower leaves often as long as or longer than the stem.

II. DENSIFLORAE.

Corolla yellow, purple, or violet-carmine, conspicuously 2-lipped, the galea vertically flattened and the lower lip protuberant; anther-cells obtuse to acutish; lower leaves shorter than the stem (except in *P. Dudleyi*).

Galea beakless, or with beak less than the width of hood (its anther-containing portion); capsule 9-15 mm. long, straight or decurved.

Bracts ovate or lance-ovate, at times caudate-tipped, sharply contrasted with the foliage

leaves; calyx-lobes distinct laterally 2-8 mm.; leaves mostly cauline, the blades ample, 1 to 2 times as long as wide, the pinnae linear- to oblong-lanceolate, dentate with obscurely denticulate teeth; stems 3-8 dm. tall. III. BRACEOSAE.

Bracts narrower, foliose-serrate distally; calyx-lobes distinct laterally 2-3 mm.; leaves mostly basal, the blades narrower, 2 to 3 times as long as wide, the pinnae deeply pinnately lobed with denticulate or dentate teeth; stems less than 4 dm. tall. IV. HIRSUTAE.

Galea with an attenuate beak that is much longer than wide; capsule less than 10 mm. long, straight or nearly so.

Beak straight or decurved, shorter than the body of the galea; corolla yellow or purple; capsule 9-10 mm. long, about twice as long as wide; calyx-lobes 1-3 mm. long.

Corolla purple, the galea raised well above the lower lip, its beak straight and the lower lip no wider than long; calyx-lobes serrate to entire; pinnae of leaf-blades strongly lobed and the lobes again serrate; stem 1-3 dm. tall, with a few small leaves or scape-like, the flowers in a terminal congested cluster or sometimes with a few lower and smaller fascicles. V. ASPLENTOLIAE.

Corolla pale yellow or white, proximally purple-spotted, the galea decurved over and enfolded by the lower lip, its elongated beak decurved over 180° from the corolla-tube and the lower lip wider than long; calyx-lobes entire; pinnae of leaf-blades simply serrate-dentate to dentate-lobed; stem 3-6 dm. tall, the leaves decreasing uniformly from base or the upper portion sometimes bare, the flowers in an elongated spike-like raceme. VI. CONTORTAE.

Beak upcurved, much longer than the body of the abruptly decurved galea; corolla purple. VII. SURRECTAE.

Segments of the simply pinnatifid leaf-blades crenate-serrulate; bracts abruptly differentiated, sessile, little longer than wide, truncate or cordate at base, the inflorescence short and dense (semi-capitate), 3-5 cm. long; corolla yellow, its lips distally purple, the galea narrowed to a beak little longer than wide; anther-cells acute. VIII. COMPACTAE.

Calyx-lobes apparently 2, the uppermost being lost and the two laterals of each side having united throughout; leaf-blades serrate or doubly crenate, the teeth cutting less than one-third distance to midrib.

Corolla purple, the truncate apex of the galea with 2 bristle-like teeth ventrally; calyx distally crenate or crenulate, the tip of each side toward the dorsal margin; capsule abruptly acute; stem with longitudinal lines of fine pubescence; leaf-blades doubly crenate, the margins usually white-callose. IX. CANADENSES.

Corolla white or purple-tinged, the galea with a slender incurved beak that nearly or quite touches the lower lip; calyx distally entire, the acuminate tip of each side medianly or slightly dorsally placed; capsule attenuate-acuminate; stem glabrous; leaf-blades serrate to crenate-serrulate, the margins less frequently callose. X. RACEMOSAE.

I. CENTRANTHERAE.

Capsule nearly symmetrical, dehiscing both ventrally and dorsally; corolla 27-28 mm. long, glabrous, the dark purple lower lip strongly contrasting with the pale (but purple-tipped) galea; leaf-blades pinnatifid, the midrib broadly winged and the segments somewhat doubly crenate-dentate. 1. *P. centranthera*.

Capsule decurved distally, only on the dorsal side rounded and dehiscent; corolla 21-23 mm. long, externally finely villous over the lower lip, mostly yellow but with the apices of both lips purple; leaf-blades more deeply and sharply cut, the midrib narrowly or proximally not winged. 2. *P. semibarbata*.

II. DENSIFLORAE.

Only species.

3. *P. densiflora*.

III. BRACEOSAE.

Apex of galea beakless.

Lobes of calyx distally filiform, glandular-pubescent, the free portions of the lateral lobes longer than their united proximal portions.

Corolla violet-carmine, 20 mm. long; glands on calyx-lobes large, blackish; bracts 15-20 mm. long, lanceolate with caudate tips, much exceeding the calyces. 4. *P. atrosanguinea*.

Corolla purple or partly yellow; glands on calyx-lobes small, pale; bracts shorter.

Corolla 13-16 mm. long, the lobes of the lower lip ciliate; bracts oval, with caudate tips. 5. *P. bracteosa*.

Corolla 18-20 mm. long, the lobes of the lower lip erosely ciliolate to eciliate; bracts lanceolate-caudate. 6. *P. paddoensis*.

Lobes of calyx lanceolate to linear, not or scarcely glandular.

Calyx-lobes linear, the free distal longer than the united proximal portions of the lateral lobes.

Inflorescence villous; free distal usually more than twice as long as the united proximal portions of the lateral calyx-lobes.

Galea in anthesis raised little above and usually enfolded by the lower lip; bracts lanceolate or ovate-lanceolate, with caudate tips that are as long as or longer than their proximal portions; leaf-blades with 6 to 8 pairs of relatively wide dentate segments; corolla greenish yellow. 7. *P. pachyrrhiza*.

Galea in anthesis raised well above and not enfolded by the lower lip; bracts ovate, with caudate tips shorter than their proximal portions; leaf-blades with 8 to 10 pairs of narrow doubly and sharply toothed segments; corolla with galea purple and lower lip yellow. 8. *P. Thompsonii*.

Inflorescence glabrous or nearly so; free distal less than twice as long as the united proximal portions of the lateral calyx-lobes; corolla greenish yellow. 9. *P. flavida*.

Calyx-lobes triangular-lanceolate, the free distal shorter than the united proximal portions of the lateral lobes; corolla either wholly greenish yellow or with purple galea. 10. *P. latifolia*.

Apex of galea narrowed to a short acute beak; corolla citron-yellow. 11. *P. Canbyi*.

IV. HIRSUTAE.

Corolla yellow, its lower lip ascending or appressed; sepals and dentations of leaf-blades acute to acuminate; cauline leaves several, not overpassed by the basal ones; stem 2.5-4 dm. tall, the raceme becoming 5-10 cm. long. 12. *P. rainierensis*.

Corolla purple, its lower lip deflexed-spreading; sepals and dentations of leaf-blades cuspidate; cauline leaves 1 or 2, much overpassed by the large basal ones; stem 1-1.5 dm. tall, the raceme only 2-4 cm. long. 13. *P. Dudleyi*.

V. ASPLENIFOLIAE.

Only Pacific States species.

14. *P. ornithorhynca*.

VI. CONTORTAE.

Only Pacific States species.

15. *P. contorta*.

VII. SURRECTAE.

Inflorescence villose; calyx-lobes laterally 1-2 mm. long; beak of galea 3-6 mm. long; cauline leaves rapidly diminishing toward upper part of stem, the dense spike semiscapose.

16. *P. attollens*.

Inflorescence glabrous; calyx-lobes laterally 0.5-1 mm. long or less; beak of galea 6-12 mm. long; cauline leaves well developed, only gradually diminishing toward upper part of stem.

17. *P. groenlandica*.

VIII. COMPACTAE.

Only Pacific States species.

18. *P. Howellii*.

IX. CANADENSES.

Only Pacific States species.

19. *P. crenulata*.

X. RACEMOSAE.

Only Pacific States species.

20. *P. racemosa*.1. *Pedicularis centránthera* A. Gray. Sharp-anthered Lousewort. Fig. 4802.*Pedicularis centránthera* A. Gray ex Torr. Bot. Mex. Bound. 120. 1859.*Pedicularis centránthera* var. *exulans* M. E. Peck, Torreya 28: 56. 1928.

Plant glabrous (except calyx-tubes which are loosely villose), the stem not over 1 dm. tall, exceeded by the leaves which may reach 15 cm. long and 5 cm. wide, with 9-12 pairs of pinnules (proximal cut to midrib), each oblong-ovate and doubly dentate, on petioles 3-6 cm. long. Bracts of inflorescence linear-oblongate, entire, scarious, 3-6 cm. long. Pedicels 1-2 mm. long; calyx 20 mm. long, with 5 cuspidate scarious-margined lobes, the uppermost smallest; corolla 35 mm. long, glabrous, purple, its slender tube 20 mm. long, the short throat and the lips 15-17 mm. long, the upper lip deflexed-hooded, the lower lip slightly shorter and with appressed dark violet-purple lobes; anther-cells with subulate-attenuate tips that project from hood of galea; capsule 10 mm. long, globose-ovoid, dehiscent both dorsally and ventrally; seeds 4 mm. long.

In sagebrush or among junipers and piñons, Upper Sonoran Zone; Great Basin province, south central Oregon to Colorado, New Mexico, and Arizona. Type locality: southern New Mexico. May-June.

2. *Pedicularis semibarbata* A. Gray. Pine-woods Lousewort. Fig. 4803.*Pedicularis semibarbata* A. Gray, Proc. Amer. Acad. 7: 385. 1868.

Inflorescence, especially the calyces and pedicels, arachnoid-lanulose, or else the plant glabrous throughout. Stem not over 1 dm. tall, exceeded by the leaves which may reach 15 cm. long and 5 cm. wide, with 9-12 pairs of pinnules (all cut essentially to midrib), each ovate and deeply pinnately cut, with segments sharply irregularly toothed, on petioles 3-4 cm. long, and with shorter oblong colorless bracts that sheath the lower stem; upper bracts of inflorescence attenuate-acuminate, slightly but sharply toothed; pedicels becoming 4-5 mm. long; calyx 10 mm. long, with 5 linear entire or slightly dentate lobes, the uppermost smallest; corolla 15-20 mm. long, externally white-villulose, pale yellow, the glabrous apices of the lips purplish, its slender tube 2-3 mm. long, the throat slightly longer, the upper lip rounded, the lower lip 2 mm. shorter, its lobes merely projecting; anther-cells with sharply acuminate tips that project from hood of galea; capsule 9 mm. long, decurved, dorsally rounded and dehiscent to base, ventrally straight and indehiscent; seeds 4 mm. long.

Dry coniferous, usually pine, woods; Transition and Canadian Zones; southern Oregon to southern California, and in adjacent Nevada. Type locality: Yosemite Valley, California. May-July.

3. *Pedicularis densiflora* Benth. Indian Warrior. Fig. 4804.*Pedicularis densiflora* Benth. ex Hook. Fl. Bor. Amer. 2: 110. 1838.*Pedicularis attenuata* Benth. in A. DC. Prod. 10: 574. 1846.

Plant finely pubescent throughout or the leaves glabrescent, the stem and inflorescence often more coarsely brown-pubescent. Stem 1-5.5 dm. tall, exceeding the leaves which may reach 18-25 cm. long and 4-5 cm. wide, with 12 to 15 pairs of pinnules (lower cut nearly to and others far toward midrib), each oblong-lanceolate, irregularly and often doubly sharply dentate, on petioles 4-10 cm. long; bracts of inflorescence about equaling the flowers, oblong-lanceolate, distally with salient sharp teeth; pedicels 3 mm. long; calyx 8 mm. long, with 5 triangular- or lanceolate-acuminate entire lobes that are all equal; corolla 25 mm. long, glabrous, deflexed from calyx-tube, the upper lip 16 mm. long, cylindric, purple-red, rounded at apex but with the actual tip obscurely protruding, the lower lip 2 mm. long, with oblong-lanceolate yellowish lobes; anther-cells acute; capsule 7 mm. long, slightly decurved, dehiscent to base both dorsally and ventrally; seeds maturing 1 or 2 to a cell, 4 mm. long.

Sandy or gravelly soil, oak or pine woodland, Upper Sonoran and Transition Zones; Pacific drainage, southern Oregon to southern California. Type locality: California. Feb.-May.

4. *Pedicularis atrosanguinea* Pennell & Thompson. Dark-flowered Lousewort. Fig. 4805.

Pedicularis atrosanguinea Pennell & Thompson ex Pennell, Bull. Torrey Club 61: 443. 1934.

Plant glabrous below the villose inflorescence. Stem 3–7 dm. tall, exceeding the leaves which may reach 15 cm. long and 8 cm. wide, with 10–15 pairs of pinnules (all but more distal of which distinct to midrib), each lanceolate, irregularly and shallowly doubly sharply dentate, the basal on petioles 4–8 cm. long, those of the cauline much shorter; bracts of inflorescence shorter than flowers, lanceolate-caudate, entire, proximally ciliate; pedicels 2 mm. long; calyx 12–14 mm. long, with 5 linear-attenuate lobes, of which the uppermost is lower-set and smallest; corolla 20–21 mm. long, glabrous, violet-carmine, the upper lip 10–12 mm. long, decurved and about equaling the tube, the lower lip 7–8 mm. long, with slightly spreading lobes. Anthers acute or acutish; capsule 12 mm. long, decurved at apex, dorsally rounded and dehiscent to base, ventrally straight and scarcely dehiscing; seeds 4 mm. long.

Open sandy or stony slopes, in coniferous forest or subalpine, Canadian and Hudsonian Zones; Olympic Mountains of western Washington. Type locality: Mount Angeles, Clallam County, Washington. July–Aug.

5. *Pedicularis bracteosa* Benth. Canadian Bracted Lousewort. Fig. 4806.

Pedicularis bracteosa Benth. ex Hook. Fl. Bor. Amer. 2: 110. 1838.

Plant glabrous below the pubescent to somewhat villose inflorescence. Stem 4–10 dm. tall, exceeding the leaves which may reach 15 cm. long and 10 cm. wide, with about 15 pairs of pinnules (all but more distal distinct to midrib), each linear or linear-lanceolate, irregularly and somewhat doubly sharply dentate, the petioles of the basal ones (mostly lost by anthesis) 4–5 cm. long, of the cauline shorter or the blades sessile; bracts of inflorescence about equaling the flowers, oval and strongly ciliate, with long caudate tips that may be slightly dentate near apex; pedicels 1–2 mm. long; calyx 12 mm. long, with 5 linear-attenuate lobes of which the uppermost is much the smallest; corolla 13–16 mm. long, glabrous, pale yellow throughout, or tube and galea purple, or usually wholly purple, the upper lip 8–9 mm. long, decurved and truncate beakless, the lower lip 5 mm. long, its rounded lobes ciliolate; anther-cells acutish; capsule 12 mm. long, decurved at apex, dorsally rounded and dehiscent to base, ventrally straight and dehiscing distally; seeds 3–3.5 mm. long.

Sandy or rocky openings in coniferous forest, Canadian Zone; mountains of eastern Washington and northeastern Idaho to Alberta and Montana. Type locality: Alberta. June–July.

6. *Pedicularis paddoënsis* Pennell. Mount Adams Lousewort. Fig. 4807.

Pedicularis paddoënsis Pennell, Bull. Torrey Club 61: 444. 1934.

Plant glabrous below the pubescent to somewhat villose inflorescence. Stem 3–7 dm. tall, exceeding the leaves which may reach 15 cm. long and 10 cm. wide, with about 12 pairs of pinnules (all but more distal distinct to midrib), each linear to linear-lanceolate, irregularly and somewhat doubly sharply dentate, the petioles of the basal ones (mostly lost by anthesis) 4–5 cm. long, of the cauline shorter or the blades sessile; bracts of inflorescence shorter than the flowers, lanceolate, loosely somewhat ciliate, distally caudate; pedicels 1.5–2 mm. long; calyx 12 mm. long, with 5 linear-attenuate lobes of which the uppermost is much the smallest; corolla 18–20 mm. long, glabrous, pale yellow to partly or wholly purple, the upper lip 10–11 mm. long, decurved and truncate beakless, the lower lip 6–7 mm. long, yellow or yellowish, its lobes erosely ciliolate or eciliate; anther-cells acutish; capsule 12 mm. long, decurved at apex, dorsally rounded and dehiscent to base, ventrally straight and only slightly dehiscing distally; seeds 3 mm. long.

Openings in coniferous forest, and on lower alpine meadows, Hudsonian and Arctic-Alpine Zones; Mount Adams, Washington. Type locality: along Bird Creek, Mount Adams, Yakima County, Washington. June–Aug.

7. *Pedicularis pachyrhiza* Pennell. Blue Mountains Lousewort. Fig. 4808.

Pedicularis pachyrhiza Pennell, Bull. Torrey Club 61: 445. 1934.

Plant glabrous below the villose inflorescence. Stem 4–9 dm. tall, exceeding the leaves which may reach 15 cm. long and 10 cm. wide (or the basal reaching 40 cm. long, on petioles 20 cm. long), with 6–8 pairs of pinnules (all but more distal distinct to midrib), each lanceolate, irregularly and somewhat doubly sharply dentate, the cauline blades nearly sessile; bracts of inflorescence equaling and becoming longer than the flowers, lanceolate or ovate-lanceolate, ciliate, the glabrous caudate tip distally dentate; pedicels 1 mm. long; calyx 11 mm. long, with 5 lanceolate attenuate lobes, of which the uppermost is very much the smallest and the others are united laterally one-third to one-half their length; corolla 18–19 mm. long, glabrous, light yellow, the upper lip 10 mm. long, decurved and the apex rounded, the lower lip 7 mm. long, its lobes slightly erose or ciliolate, appressed; anther-cells acute; capsule 10 mm. long, decurved at apex, dorsally rounded and dehiscent, ventrally straight and not or only slightly dehiscing distally.

Damp thickets or open coniferous forest, Canadian Zone; Blue and Wallowa Mountains of southeastern Washington and northeastern Oregon. Type locality: Blue Mountains, Union County, Oregon. June–Aug.

8. *Pedicularis Thompsonii* Pennell. Thompson's Lousewort. Fig. 4809.

Pedicularis Thompsonii Pennell, Bull. Torrey Club 61: 447. 1934.

Plant glabrous below the villose inflorescence. Stem 3–6 dm. tall, exceeding the leaves which may reach at least 10 cm. long and 6 cm. wide, with 8 to 11 pairs of pinnules (all but most distal

distinct to midrib), each linear-lanceolate, irregularly and somewhat doubly sharply dentate, the cauline blades nearly sessile; bracts of inflorescence shorter than the flowers, ovate or oval and loosely ciliate, the glabrous caudate tip slightly crenate-dentate; pedicels 2 mm. long; calyx 11–12 mm. long, with 5 linear-attenuate lobes, of which the uppermost is very much the smallest and the others are united laterally one-fourth to one-third their length; corolla 18 mm. long, glabrous, dorsally purple and ventrally yellow, the upper lip 10–11 mm. long, with rounded apex, the lower lip 7–8 mm. long, its lobes slightly erose or ciliate and distally spreading; anther-cells acutish; capsule 12 mm. long, dorsally rounded, ventrally straight, not seen mature.

Open coniferous forest and alpine meadows, Hudsonian and lower Arctic-Alpine Zones; mountains, southern British Columbia to northern Washington and northern Idaho. Type locality: Wauconda, Okanogan County, Washington. June–Aug.

9. *Pedicularis flàvida* Pennell. Cascade Mountains Lousewort. Fig. 4810.

Pedicularis flàvida Pennell, Bull. Torrey Club 61: 445. 1934.

Plant glabrous throughout, or with calyx-lobes sometimes finely ciliate. Stem 3–8 dm. tall, exceeding the leaves which may reach 8–10 cm. long and 5–6 cm. wide, with 9 to 12 pairs of pinnules (all but the distal distinct to midrib), each linear-lanceolate, irregularly and somewhat doubly sharply dentate, the cauline blades nearly sessile, but the basal on petioles often 10 cm. long; bracts of inflorescence shorter than the flowers, proximally ovate-lanceolate and entire, the caudate distal half finely dentate; pedicels 1.5–2 mm. long; calyx 9–10 mm. long, with 5 linear-attenuate lobes, of which the uppermost is much the smallest and the others are united laterally nearly one-half their length; corolla 15–17 mm. long, glabrous, light yellow, the upper lip 9 mm. long, decurved, strongly hooded, with rounded apex, the lower lip 5 mm. long, its erose lobes spreading; anther-cells acute; capsule 9 mm. long, decurved at apex, dorsally rounded and dehiscing throughout, ventrally straight and not dehiscing.

Moist meadows and thickets, and in moist coniferous forest, Canadian Zone; Cascade Mountains of Oregon. Type locality: Elk Lake, Deschutes County, Oregon. June–Aug.

10. *Pedicularis latifolia* Pennell. Wide-leaved Lousewort. Fig. 4811.

Pedicularis latifolia Pennell, Bull. Torrey Club 61: 448. 1934.

Plant glabrous below the slightly hairy inflorescence. Stem 4–12 dm. tall, exceeding the leaves which may reach 15–20 cm. long and 10–15 cm. wide, with 8 to 10 pairs of pinnules (all but the distal distinct to midrib), each linear-lanceolate, irregularly and somewhat doubly sharply dentate, the cauline blades nearly sessile, but the basal on long petioles; bracts of inflorescence shorter than the flowers, proximally ovate or ovate-lanceolate, entire usually proximally or throughout, the caudate distal half crenate-dentate toward apex; pedicels 1–1.5 mm. long; calyx 11–13 mm. long, with 5 lanceolate lobes, of which the uppermost is lower-set and so much the smallest, the others united laterally about two-thirds their length; corolla 16–18 mm. long, glabrous, citron-yellow to partially or wholly purple, the upper lip 10 mm. long, truncately rounded at apex, the lower lip 5 mm. long, its lobes slightly erose or ciliate and spreading; anther-cells acute; capsule 10 mm. long, decurved at apex, dorsally rounded and dehiscing throughout, ventrally straight and dehiscing only slightly near apex; seeds 3 mm. long.

Open coniferous forest, Canadian and Hudsonian Zones; mountains, Cascade Range from Okanogan County south to Mount Rainier, Washington, and east to northern Idaho. Type locality: Paradise Inn, Mount Rainier, Washington. June–Aug.

11. *Pedicularis Cánbyi* A. Gray. Canby's Lousewort. Fig. 4812.

Pedicularis Canbyi A. Gray, Syn. Fl. N. Amer. ed. 2. 2¹: 454. 1886.

Pedicularis stífolia Rydb. Bull. Torrey Club 34: 35. 1907.

Plant glabrous below the slightly villose inflorescence. Stem 3–5 dm. tall, exceeding the leaves which may reach 12–15 cm. long and 7–8 cm. wide, with 6 to 9 pairs of pinnules (all but distal distinct to midrib), each linear or lance-linear, irregularly and somewhat doubly sharply dentate, the cauline blades nearly sessile, but the basal on petioles which may reach 10 cm. long; bracts of inflorescence shorter than the flowers, ovate or lance-ovate, entire and ciliate, the caudate distal third serrate-dentate; pedicels 1–1.5 mm. long; calyx 7–9 mm. long, with 5 linear-lanceolate lobes, of which the uppermost is lower-set and shortest, the others united laterally about two-thirds their length; corolla 15–17 mm. long, glabrous, citron-yellow, the upper lip 9–10 mm. long, distally decurved and rounded to a beak 1–2 mm. long, the lower lip 5 mm. long, its erose lobes spreading; anther-cells acute; capsule 8–9 mm. long, decurved at apex, dorsally rounded and dehiscing throughout, ventrally straight and dehiscing distally; seeds 4 mm. long.

Open coniferous forest, Canadian Zone; mountains, southeastern Washington to western Montana. Type locality: McDonald's Peak, Mission Range, Montana. May–Aug.

12. *Pedicularis rainierénsis* Pennell & Warren. Mount Rainier Lousewort. Fig. 4813.

Pedicularis rainierensis Pennell & Warren, Bull. Torrey Club 55: 317. 1928.

Plant glabrous below the villose inflorescence. Stem 1.5–4 dm. tall, exceeding the leaves, the blades of which may reach 8–10 cm. long and 3 cm. wide, with 9 to 12 pairs of pinnules (all but the distal distinct to midrib), each lanceolate and deeply cut into irregularly dentate pinnately arranged lobes, the upper cauline blades sessile but the lower and basal on petioles that may reach 3–5 cm. long; bracts of inflorescence shorter than the flowers, lanceolate, entire and ciliate, the caudate distal half somewhat foliose and serrate-dentate toward apex; pedicels

1–2 mm. long; calyx 7 mm. long, with 5 lanceolate-attenuate lobes, of which the uppermost is lower-set and much the shortest, the others united laterally over two-thirds their length; corolla 15–16 mm. long, glabrous, yellow, the upper lip 8 mm. long, distally decurved and truncately rounded, the lower lip 4 mm. long, its erose lobes spreading; anther-cells acute; capsule 8 mm. long, dorsally rounded and dehiscing throughout, ventrally less rounded and scarcely dehiscing; seeds 3.5–4 mm. long.

Moist alpine meadows and open coniferous forest, Arctic-Alpine Zone; Mount Rainier, Cascade Range, Washington. Type locality: Indian Henry's, Mount Rainier National Park, Pierce County, Washington. July–Aug.

13. *Pedicularis Dúdleyi* Elmer. Dudley's Lousewort. Fig. 4814.

Pedicularis Dudleyi Elmer, Bot. Gaz. 41: 316. 1906.

Plant pubescent throughout, or with the upper surfaces or the whole leaf-blades glabrous, the inflorescence villose. Stem 1–1.5 dm. tall, exceeded by the leaves, which are mostly basal and may reach 15–20 cm. long and 4–6 cm. wide, with 6–12 pairs of pinnules (all but the most distal distinct to midrib), each elliptic-oblong to ovate and deeply doubly cut into sharp-toothed segments, the petioles much shorter than the blades; bracts of inflorescence in early anthesis shorter than, but later equaling or exceeding the flowers, oblong-lanceolate, sharply serrate distad to the entire base; pedicels very short; calyx 10–11 mm. long, with 5 lanceolate callose-tipped lobes, of which the uppermost is lower-set and shorter, the others about equally distinct; corolla 17–18 mm. long, glabrous, purple, the upper lip 10–11 mm. long, very strongly flattened, distally slightly decurved and rounded at apex, the lower lip 6 mm. long, pale or white, divaricately spreading; anthers obtuse or obtusish.

Coniferous (redwood) forest, Humid Transition Zone; Santa Cruz Mountains, middle coastal California. Type locality: Pescadero Creek, San Mateo County, California. May–June.

14. *Pedicularis ornithorhýnca* Benth. Bird's Beak Lousewort. Fig. 4815.

Pedicularis ornithorhynca Benth. ex Hook. Fl. Bor. Amer. 2: 108. 1838.

Plant glabrous below the villose inflorescence. Stem 1.5–3 dm. tall, exceeding the leaves which are all basal or nearly so, and may reach 10 cm. long and 1.5 cm. wide, with 9–12 pairs of pinnules (all but the most distal distinct to the narrowly margined midrib), each oblong-lanceolate and irregularly somewhat doubly cut into rounded or acutely toothed lobules, the petioles usually shorter than the blades; bracts of inflorescence shorter than the flowers, linear-lanceolate with a few divaricate lobes; pedicels 2–3 mm. long; calyx 8 mm. long, with 5 ovate nearly or quite entire acute lobes, of which the uppermost is only slightly the shortest and the others about equally distinct; corolla 15–17 mm. long, nearly glabrous, purple, the upper lip 8–10 mm. long, decurved 90–110° and cuneately narrowed to a slender straight tapering beak 3–4 mm. long, the lower lip little shorter, its widely rounded ciliate lobes deflexed-spreading; anther-cells acute; capsule 9 mm. long, dorsally rounded and dehiscing throughout, ventrally straight and not dehiscent.

Moist meadows and openings in coniferous forest, Hudsonian and Arctic-Alpine Zones; mountains, southeastern Alaska to western Washington. Type locality: Mount Rainier, Washington. July–Aug.

15. *Pedicularis contórtá* Benth. White Coiled-beak Lousewort. Fig. 4816.

Pedicularis contorta Benth. ex Hook. Fl. Bor. Amer. 2: 108. 1838.

Plant glabrous throughout. Stem 3–6 dm. tall, exceeding the leaves which are basal or on lower part of stem and may reach 15 cm. long and 2–3 cm. wide, with about 12 pairs of pinnules (all cut to the narrowly margined midrib), each linear and somewhat saliently serrate-dentate, the basal on petioles usually shorter than the blades, the cauline short-petioled or sessile, the upper ones smaller and transformed to linear or linear-lobed bracts below the inflorescence; bracts of inflorescence shorter than or about equaling the flowers, linear-lanceolate, with a few ascending-spreading similar lobes. Pedicels 3–5 mm. long; calyx 6–8 mm. long, with 5 ovate subulate-caudate entire lobes, of which the uppermost is lower-set and shortest; corolla 15 mm. long, glabrous, white or faintly yellow, with fine dark purple spots on hood of galea and similar median lines on basal part of lowermost lobe, its upper lip decurved to 180° or more and distally forming an attenuate beak that upcurves at apex, its lower lip with narrow median and widely flaring lateral lobes that enfold the galea; anther-cells acute; capsule 9–10 mm. long, dorsally rounded and dehiscing most of length, ventrally straight and dehiscing distally; seeds 2 mm. long.

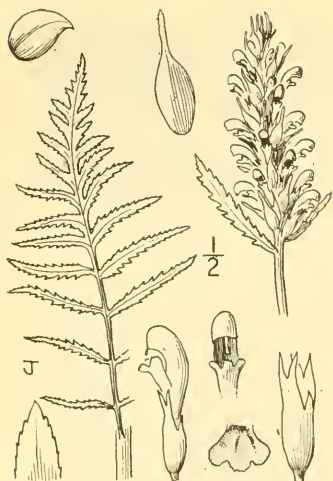
Meadows and open coniferous forest, Canadian and Hudsonian Zones; mountains, British Columbia to northern California, east to Alberta and Montana. Type locality: Mount Rainier, Washington. July–Aug.

16. *Pedicularis attóllens* A. Gray. Little Elephant's Head. Fig. 4817.

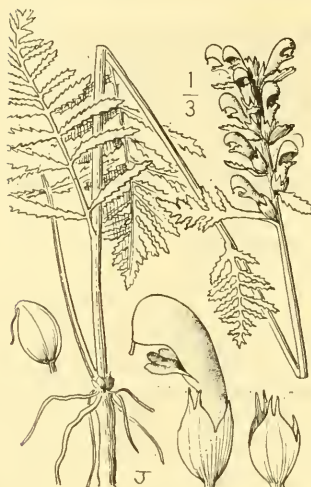
Pedicularis attollens A. Gray, Proc. Amer. Acad. 7: 384. 1867.

Elephantella attollens Heller, Muhlbergia 1: 4. 1900.

Plant glabrous below the villose inflorescence. Stem 3–4 dm. tall, exceeding the leaves which are basal and on lower part of stem and which may reach 8–12 cm. long and 1–1.5 cm. wide, with 12 to 15 pairs of pinnules (all cut to the narrowly margined midrib), each linear and somewhat saliently and callosely serrate-dentate, the basal on petioles usually shorter than the blades, the cauline short-petioled or sessile, the upper much smaller; bracts of inflorescence shorter than or equaling the flowers, linear-lanceolate, with 1–3 approximate pairs of slender spreading lobes; pedicels 1–2 mm. long; calyx 5 mm. long, with 5 lance-linear entire lobes, the uppermost lower-set and much the shortest, of the others the dorsal slightly exceeding the



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4810. *Pedicularis flavida*
 4811. *Pedicularis latifolia*
 4812. *Pedicularis Canbyi*

4813. *Pedicularis rainierensis*
 4814. *Pedicularis Dudleyi*
 4815. *Pedicularis ornithorhynca*

4816. *Pedicularis contorta*
 4817. *Pedicularis attollensis*
 4818. *Pedicularis groenlandica*

ventral lobes, the calyx-tube deeply cleft ventrally; corolla about 7 mm. long, glabrous, mallow-purple, its tube decurved through ventral cleft of calyx, its upper lip proximally white, then decurved and narrowed to a knob-like portion that bears 2 dark purple areas, thence upraised-projecting and prolonged into a slender once-coiled beak (white, but spotted and splotted with purple), its ample lower lip deflexed-spreading, with median lobe narrowest, the lobes all proximally white and distally mallow-pink; anther-cells obtuse; capsule 9 mm. long, dorsally more rounded and dehiscing throughout, ventrally convexly curved and dehiscing distally; seeds 3 mm. long.

Moist meadows and openings in coniferous forest, Canadian and Hudsonian Zones; Cascade Mountains of Oregon and Sierra Nevada of California. Type locality: "Big Tree Road," Sierra Nevada, California. June-Sept.

Pedicularis attollens subsp. *protogyna* Pennell, Proc. Acad. Phila. 99: 175. 1947. Plant larger, with corollas larger; the beak of the galea 5-6 mm. long; the lower lip 7-8 mm. long, concave, and with narrower purple lines median to each lobe; flowers more clearly protogynous, the stigmas being exposed only before anthesis. Meadows and marshes, Canadian Zone; mountains, southern Oregon and northern California. Type locality: east of Westwood, Lassen County, California. June-Sept.

17. *Pedicularis groenlandica* Retz. Elephant's Head. Fig. 4818.

Pedicularis groenlandica Retz. Prod. Fl. Scand. ed. 2. 145. 1795.

Elephantella groenlandica Rydb. Mem. N.Y. Bot. Gard. 1: 362. 1900.

Plant glabrous throughout. Stem 3-7 dm. tall, exceeding the leaves which are basal and on lower part of stem and which may reach 10-15 cm. long and 2 cm. wide, with 12-15 pairs of pinnules (all cut to the narrowly margined midrib), each linear-lanceolate and somewhat saliently and callosely serrate-dentate, the basal on petioles usually shorter than the blades, the cauline short-petioled or sessile, the upper much smaller; bracts of inflorescence shorter than the flowers, linear-lanceolate, with a few pairs of slender lobes; pedicels 1-1.5 mm. long; calyx 4-5 mm. long, with 5 subulate entire lobes, of which the uppermost is scarcely shorter than the others, the calyx-tube hardly cleft ventrally; corolla 8-10 mm. long, glabrous, red-purple (rose-purple), its tube straight, its upper lip arched and decurved, dark purple, terminating in a slender and side-curving dark purple beak 4-8 mm. long, its lower lip deflexed-spreading, light mallow-purple, the middle lobe somewhat the narrowest; anther-cells acute; capsule 6-8 mm. long, dorsally rounded and dehiscing throughout, ventrally less rounded and dehiscing distally; seeds 3 mm. long.

Wet mountain meadows, Hudsonian and Arctic-Alpine Zones; Sierra Nevada of California, and widespread over boreal North America. Type locality: "Greenland," where actually unknown, the type presumably from Labrador. July-Aug.

Pedicularis groenlandica subsp. *surrecta* (Benth.) Piper, Mazama 2: 100. 1901. (*Pedicularisurrecta* Benth. ex Hook Fl. Bor. Amer. 2: 107. 1838.) Beak of galea 8-14 mm. long, its hood and the lower lip pale; capsule 7-12 mm. long. Alpine meadows and shores of streams and ponds, Canadian Zone to Arctic-Alpine Zone; mountains, western North America from Washington and Montana south to California and New Mexico. Type locality: Blue Mountains. June-Aug.

18. *Pedicularis Howëllii* A. Gray. Howell's Lousewort. Fig. 4819.

Pedicularis Howëllii A. Gray, Proc. Amer. Acad. 20: 307. 1885.

Stem minutely pubescent below the villous inflorescence, the leaves glabrous except for midrib minutely pubescent above. Stem 3-4 dm. tall, exceeding the leaves which are all cauline and may reach 6 cm. long and 3.5 cm. wide, with 1-3 pairs of pinnules (all but most distal cut to the nearly or quite marginless midrib), each oblong-rounded and shallowly dentate with rounded lobes, the petioles much shorter than the blades; bracts of inflorescence nearly equaling the flowers, entire and ciliate, ovate and slightly caudate; pedicels 1 mm. long; calyx 6-7 mm. long, with 5 lanose broadly rounded lobes, of which the uppermost is lower-set and the shortest; corolla 8-9 mm. long, glabrous, yellow, the tube straight; its upper lip arched and decurved about 60° to the purplish hood, whence narrowed and decurved 90° into the nearly or quite beaked apex, 1-2 mm. long; its lower lip only 2-3 mm. long, with purplish erose lobes; anther-cells acute; capsule 8 mm. long, dorsally rounded and dehiscing throughout, ventrally straight and nearly indehiscent; seeds 1.5-2 mm. long.

Coniferous forest, Canadian Zone; Siskiyou Mountains of southwestern Oregon and northwestern California. Type locality: Siskiyou Mountains, California. June-Aug.

19. *Pedicularis crenulata* Benth. Margined-leaf Lousewort. Fig. 4820.

Pedicularis crenulata Benth. in A. DC. Prod. 10: 568. 1846.

Pedicularis albomarginata M. E. Jones, Contr. West. Bot. No. 8: 38. 1898.

Stem densely whitish-pubescent below, lineately so above, loosely villose to nearly glabrous in the inflorescence, the leaves wholly glabrous. Stem 2-3.5 dm. tall, exceeding the leaves which are all cauline, very numerous, and may reach 4-6 cm. long and 4-5 mm. wide, linear to linear-oblongate, crenate-dentate or somewhat doubly crenate, with callose white margins; bracts of inflorescence shorter than the flowers, proximally entire but distally callosely crenate; pedicels 3-4 mm. long; calyx 11 mm. long, the uppermost sepal lacking and the others with those of each side wholly united into a single obtuse or acute upcurved lobe, the calyx-tube cleft deeply ventrally; corolla 22 mm. long, glabrous, purple, its tube slightly decurved through ventral cleft of calyx; its upper lip 11-12 mm. long, ascending, distally decurved and rounded-hooded, at apex truncate with a lax subulate small tooth to each side ventrally; its lower lip with median lobe strongly 2-ridged proximally, the lateral lobes widely spreading; anther-cells acute

or acutish; capsule 16 mm. long, distally attenuate, dehiscent throughout dorsally but scarcely at all ventrally; seeds 1.5 mm. long.

Grassy meadows and stream banks, Upper Sonoran Zone; Mono County, eastern California, to southern Wyoming and Colorado. Type locality: southeastern Wyoming. June-July.

20. *Pedicularis racemosa* Dougl. Leafy Lousewort. Fig. 4821.

Pedicularis racemosa Dougl. ex Hook. Fl. Bor. Amer. 2: 108. 1838.

Plant glabrous below the inflorescence, its rachis with fine lines of pubescence. Stem 3-5 dm. tall, the leaves all cauline, numerous, and reaching 4-7 cm. long, the blades 0.8-2 cm. wide, lanceolate or widely so, usually widest slightly below or about the middle, acute, serrate-dentate with the teeth again serrate, rounded or cuneately narrowed to short petioles; bracts of inflorescence equaling or longer than the flowers, similar to but smaller than the leaves; pedicels 2-5 mm. long; calyx 5-8 mm. long, the uppermost sepal lacking and the others with those of each side wholly united into a single obliquely ovate lobe that terminates in a dorsally placed caudate-mucronate tip, the calyx-tube deeply cleft ventrally; corolla 10-12 mm. long, glabrous, pale violet-purple to rose-purple, its tube decurved through ventral cleft of calyx; its upper lip erect 6-7 mm. and widening to hood, then abruptly decurved 90° and cuneately narrowed to a filiform beak 5-6 mm. long that is arcuately decurved 90° or more; its lower lip about 5 mm. long, deflexed-spreading, its median lobe narrowest, the laterals wider than long so that the whole lunately expanded lip is 12-13 mm. wide; anther-cells acute to obtuse; capsule 10-12 mm. long, lunately lance-attenuate, dorsally rounded and dehiscent throughout, ventrally straight and indehiscent.

Open coniferous forest, Canadian Zone; British Columbia to northern California, mainly on the Cascade and Klamath Mountains. Type locality: "high mountains" (Cascade Range) above Grand Rapids of the Columbia River in Washington or Oregon. June-Aug.

Pedicularis racemosa subsp. *alba* Pennell, Proc. Acad. Phila. 99: 176. 1947. Corolla white or slightly purplish; leaf-blades linear-lanceolate to lanceolate, relatively rarely wider, widest near the base and thence tapering to the apex; stem 3-5 dm. tall. Open coniferous forest, Canadian and Hudsonian Zones; mountains, eastern Washington (rare west to Mount Rainier) and northeastern Oregon to southeastern British Columbia, Montana, and New Mexico. Type locality: near Musselshell Creek, near Lolo Creek, Clearwater County, Idaho. July-Sept.

28. *MELAMPYRUM* [Bauhin] L. Sp. Pl. 605. 1753.

Erect annual herbs, with opposite leaves and a leafy-bracted raceme of white flowers. Bracteoles none. Calyx of 4 sepals (the uppermost lacking), which are united near base. Corolla 2-lipped, the upper lip galeate (with component petals united to apex) and internally pubescent, the lower lip equaling it in length, with a puberulent palate upraised against upper lip and with 3 short lobes. Stamens 4, the anther-cells proximally hairy and awned. Capsule flattened, in our species lunate and somewhat decurved, acute, dehiscent only on the rounded dorsal side. Seeds few, hard, nut-like, exposed by the ruptured capsule. [Name Greek, meaning black wheat.]

About 20 species, the others of Europe and Asia. Type species, *Melampyrum arvense* L.

1. *Melampyrum lineare* Desr. American Cow-Wheat. Fig. 4822.

Melampyrum lineare Desr. Encyc. Meth. Bot. 4: 22. 1796.

Plant puberulent, much-branched, 1.5-3 dm. tall. Leaves lanceolate, attenuate, entire, the upper that subtend flowers somewhat shorter and often truncately widened at base and sometimes with a few spreading setaceous teeth; pedicels nearly 2 mm. long; calyx-lobes lanceolate-attenuate, becoming 5 mm. long; corolla 6-9 mm. long, white, with yellow palate, and with the tips of the lips often reddish; capsule 7-9 mm. long; seeds 3 mm. long, lustrous-black, with yellow or yellowish white narrowed base.

Sandy woodland, Canadian Zone; southern British Columbia and northeastern Washington to Newfoundland, its subspecies extending south on the Appalachian Mountains to Georgia. Type locality: presumably eastern Canada. July-Aug.

29. *ORTHOCARPUS** Nutt. Gen. 2: 56. 1818.

Erect or diffuse annual herbs, with sessile, alternate, narrow, entire or pinnately lobed or parted leaves, and prominently bracteate spiciform inflorescences. Calyx tubular-campanulate, 4-cleft, or cleft before and behind and the divisions 2-lobed. Corolla narrowly tubular, strongly bilabiate, valvate, the erect, entire, beak-like upper lip (galea) scarcely surpassing the much inflated saccate lower lip, which is tipped with 3 small teeth. Stamens 4, attached near the summit of the tube; anthers 1- or 2-celled, thin, usually explanate and ciliate. Capsule loculicidal. Seeds few to numerous, with reticulate or alveolate, often loose coat. [Name Greek, meaning upright fruit.]

A genus of about 25 species, principally confined to the western United States and adjacent borders. One species is confined to the central Andes. Type species, *Orthocarpus luteus* Nutt.

* Text contributed by David Daniels Keck.

Antthers 2-celled (Subgenus *Eworthocarpus*).

Lower lip of corolla more or less 3-saccate; seed coat loose-fitting except in *campestris*.

Bracts green throughout; lower lip deeply 3-saccate; galea equaling or barely exceeding lower lip; teeth inconspicuous. I. CORDYLANTHOIDES.

Bracts tipped with purple or yellow; galea exceeding lower lip; teeth erect. II. CASTILLEJOIDES.

Lower lip of corolla simply saccate or nearly so; seed coat tight-fitting or ridged. III. MONOSACCUS.

Antthers 1-celled; seed coat tight-fitting or ridged (Subgenus *Triphysaria*). IV. EUTRIPHSARIA.

I. CORDYLANTHOIDES.

Lower cell of anthers one-fourth or one-fifth as long as upper cell; bracts entire.

Lower cell of anthers not less than one-half as long as upper cell; bracts cleft into linear or lanceolate lobes.

Galea finely pubescent or puberulent, not white-villous.

Lower lip of corolla 5-8 mm. wide.

Lower lip of corolla 4 mm. wide or less.

Ventral margins of galea pubescent; sacs of lower lip 3-5 mm. deep.

Ventral margins of galea glabrous; sacs of lower lip about 2 mm. deep.

Galea densely white-villous.

1. *O. campestris*.

2. *O. lithospermoides*.

3. *O. lacerus*.

4. *O. hispidus*.

5. *O. lasiorhynchus*.

II. CASTILLEJOIDES.

Corolla wider above, lower lip more than 2 mm. deep; spike usually broad and conspicuous.

Stems pubescent or nearly glabrous; spike showy.

Galea nearly straight, pubescent.

Leaves oblong, more than 3 mm. wide, entire or with rounded teeth; stems usually ascending or the plants forming mats. Saline situations. 6. *O. castillejoides*.

Leaves lanceolate, less than 3 mm. wide, with linear divisions, attenuate; stems erect. 7. *O. densiflorus*.

Galea hooked at tip, densely bearded; stems purple; leaf-divisions filiform. 8. *O. purpurascens*.

Stems villous-pubescent above; spike pale. Sierra Nevada foothills. 9. *O. linearilobus*.

Corolla linear, lower lip 2 mm. or less deep; spike narrow, pale and rather inconspicuous. 10. *O. attenuatus*.

III. MONOSACCUS.

Bracts and calyx glandular-pubescent; bracts gradually differing from upper leaves; style glabrous.

Corolla yellow; lower lip relatively shallow, 3.5-4 mm. long. 11. *O. luteus*.

Corolla rose-purple; lower lip relatively deep, 5-7 mm. long. 12. *O. bracteosus*.

Bracts and calyx not glandular; bracts abruptly differing from upper leaves; style microscopically pubescent except in *barbatus*.

Galea pubescent, even at tip.

Lower bracts prominently margined with flattened white hairs; galea distinctly hooked; leaves filiform or filiform-lobed, gray-green. 13. *O. tenuifolius*.

Lower bracts not prominently margined with hairs.

Galea straight, triangular, tip bearing a bearded tuft of hairs. 14. *O. barbatus*.

Galea curved, margin inrolling, tip pubescent; leaves linear-lanceolate or linear-lanceolate-lobed, deep green.

Corolla 20-25 mm. long; galea exceeding lower lip by 3-5 mm. 15. *O. cuspidatus*.

Corolla 12-15 mm. long; galea equaling or exceeding lower lip by less than 2.5 mm. 16. *O. Copelandii*.

Galea puberulent, glabrate at very tip.

Corolla 20-30 mm. long; tip of galea inflexed 1 mm., galea surpassing lower lip 2.5-3 mm. 17. *O. pachystachyus*.

Corolla 10-18 mm. long; tip of galea inflexed 0.5 mm., galea surpassing lower lip about 1 mm. 18. *O. imbricatus*.

IV. EUTRIPHSARIA.

Stamens shorter than galea; each lobe of lower lip less than 1.5 times deeper than long.

Branches divergent from the erect central axis; flowers showy, usually conspicuously exserted; galea straight or gradually curved; bracts pinnatifid.

Galea purple; herbage pubescent. 19. *O. erianthus*.

Galea yellowish; herbage glabrous, or puberulent within inflorescence. 20. *O. fauceibaratus*.

Branches many, weak, ascending from base, the central axis indistinct; flowers minute, inconspicuous; galea sharply curved; bracts often bipinnatifid. 21. *O. pusillus*.

Stamens exceeding galea; each lobe of lower lip a deep sac, 1.5 times deeper than long. 22. *O. floribundus*.

1. *Orthocarpus campestris* Benth. Field *Orthocarpus*. Fig. 4823.

Orthocarpus campestris Benth. Pl. Hartw. 329. 1839.

Orthocarpus columbinus M. E. Jones, Contr. West. Bot. No. 8: 37. 1898.

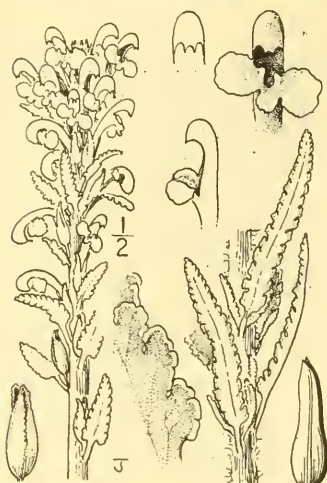
Orthocarpus campestris var. *succulentus* Hoover, Leaflets West. Bot. 1: 228. 1936.

Stem simple or branched, 1-2.5 dm. high, the herbage glabrous below. Leaves entire, narrowly linear-lanceolate, 1.5-4 cm. long; spike dense, much elongated to subglobose; bracts like the leaves but shorter, glabrous, ciliate, or somewhat hirsute at base; calyx strongly hirsute, 2-cleft to the middle, each division 2-cleft halfway with subulate teeth; corolla bright yellow, sometimes whitish, 15-25 mm. long, lower lip very ample, abruptly widening from the narrow tube, 4-5 mm. long, 3-5 mm. deep, villous within anteriorly, the oblong teeth 1.5-2 mm. long; galea straight, narrow, slightly surpassing the lower lip; anthers 2-celled, the lower cell much reduced or vestigial.

Bottoms of winter pools and low moist ground, Upper Sonoran and Arid Transition Zones; Harney and Lake Counties, Oregon, to Fresno County, California. Type locality: Sacramento Valley. May-July.



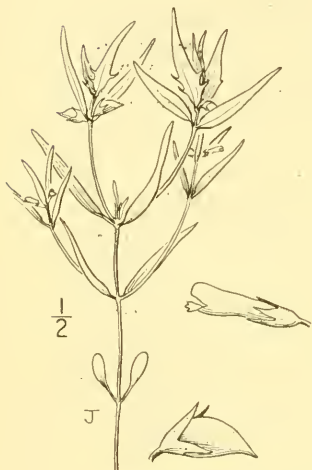
4819



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4819. *Pedicularis Howellii*
 4820. *Pedicularis crénulata*
 4821. *Pedicularis racemosa*

4822. *Melampyrum lineare*
 4823. *Orthocarpus campestris*
 4824. *Orthocarpus lithospermoides*

4825. *Orthocarpus lacerus*
 4826. *Orthocarpus hispidus*
 4827. *Orthocarpus lasiorhynchus*

2. *Orthocarpus lithospermoides* Benth. Cream Sacs. Fig. 4824.

Orthocarpus lithospermoides Benth. Scroph. Indicae 13. 1835.

Stem relatively stout, erect, simple or strictly branched, 1.5–7 dm. high, the herbage rather densely hirsute and glandular-pubescent especially above. Leaves narrowly to broadly lanceolate below, entire, the upper ones becoming prominently pinnatifid with 3–7 long linear lobes, gradually merging into the palmately lobed bracts; spike heavy, condensed, the flowers exserted; calyx subequally 4-lobed; corolla clear yellow, usually with 2 purple spots at base of lower lip, 15–25 mm. long, densely puberulent, the rather abruptly dilated lower lip very large, each sac subglobose, 4–6 mm. deep, floccose within, the subulate teeth small and inconspicuous, the galea scarcely exceeding the lower lip.

Open grassy fields and slopes, Upper Sonoran and Humid Transition Zones; Douglas County, Oregon, to Santa Clara County, California. Type locality: probably near San Francisco. April–July.

Orthocarpus lithospermoides var. *bicolor* (Heller) Jepson, Man. Fl. Pl. Calif. 942. 1925. (*Orthocarpus bicolor* Heller, Muhlenbergia 1: 59. 1904; *O. rubicundulus* Jepson, Man. Fl. Pl. Calif. 943. 1925.) Corolla white, turning pinkish with age. Sacramento Valley and surrounding foothills, California, from Siskiyou County to Butte, Lake and Napa Counties. Type locality: Clear Creek, Butte County.

3. *Orthocarpus lacerus* Benth. Cut-leaved *Orthocarpus*. Fig. 4825.

Orthocarpus lacerus Benth. Pl. Hartw. 329. 1839.

Orthocarpus Brownii Eastw. Bull. Torrey Club 32: 210. 1905.

Stem slender, erect, simple or with ascending branches, 1–3 dm. high, the herbage finely pubescent, becoming villous and minutely glandular above. Leaves narrowly linear-lanceolate or filiform, the upper ones pinnately parted into 3–7 filiform lobes; spike rather lax; bracts palmately 3–7-cleft, 1–2 cm. long; calyx half as long as corolla, subequally 4-lobed; corolla bright yellow with two brown dots at base of lower lip, 12–18 mm. long, finely pubescent, the inflated lower lip about 4 mm. deep, the narrowly oblong teeth 1 mm. long; galea straight, slightly exceeding lower lip, pubescent without and within including inner margin.

Wet meadows and dry grassy slopes, mainly Arid Transition Zone; Cascade Range, southern Oregon, along the western flank of the Sierra Nevada to Fresno County, California. Type locality: Sacramento Valley foothills. May–July.

4. *Orthocarpus hispidus* Benth. Hairy *Orthocarpus*. Fig. 4826.

Orthocarpus hispidus Benth. Scroph. Indicae 13. 1835.

Orthocarpus tenuis Heller, Muhlenbergia 1: 45. 1904.

Orthocarpus falcatus Eastw. Bull. Torrey Club 32: 212. 1905.

Orthocarpus rarior Suksd. Allg. Bot. Zeit. 12: 27. 1906.

Triphysaria hispida Rydb. Bull. Torrey Club 40: 484. 1913.

Orthocarpus hispidus var. *tenuis* Macbride & Payson, Contr. Gray Herb. No. 49: 70. 1917.

Stems slender, erect, simple or with few erect branches, 1–4 dm. high, the herbage pubescent below, becoming somewhat glandular and more or less strongly hirsute above. Leaves very narrowly linear-lanceolate, caudate, the lower entire, the upper 3–5-cleft; spike slender, elongated, the flowers only slightly exserted; bracts ovate, palmately 3–7-cleft into attenuate lobes; calyx 8–10 mm. long; corolla white or yellow, 12–20 mm. long, pubescent, the small lower lip only about 2 mm. deep, bearded within, the teeth small; galea usually straight, narrow, exceeding lower lip 1–2 mm., the margin on ventral side glabrous.

Moist or dry meadows, Upper Sonoran and Transition Zones; southern Alaska to Mendocino and Tulare Counties, California, and very rare in southern California, east to Idaho and Nevada. Type locality: banks of the Columbia. June–Aug.

5. *Orthocarpus lasiorhynchus* A. Gray. San Bernardino *Orthocarpus*. Fig. 4827.

Orthocarpus lasiorhynchus A. Gray, Proc. Amer. Acad. 12: 82. 1876.

Stem slender, erect, often with erect branches, 1–3 dm. high, the herbage pilose. Leaves linear-lanceolate, at least the upper ones with a pair of small lateral lobes; spike loose; bracts 3–5-parted with linear divisions, 6–12 mm. long, the very tips of the upper ones often yellow and almost bearded; calyx equaling the bracts, cleft halfway into two lobes each with two teeth half as long; corolla yellow with two minute blackish dots at base of lower lip, 12–25 mm. long, the slender tube gradually expanding into the obovoid much inflated lower lip which is 6–7 mm. long and 4–5 mm. deep, with orifice and thin erect teeth softly bearded; galea straight, subulate, the tip soft, bearded, exceeding lower lip 2 mm.

Meadows, Arid Transition Zone; San Bernardino, San Jacinto, and Cuyamaca Mountains, southern California; not common. Type locality: Mojave River, north slope of the San Bernardino Mountains. June–Aug.

6. *Orthocarpus castillejoideus* Benth. Paint-brush *Orthocarpus*. Fig. 4828.

Orthocarpus castillejoideus Benth. Scroph. Indicae 13. 1835.

Orthocarpus maculatus Eastw. Bull. Torrey Club 32: 210. 1905.

Orthocarpus longispicatus Elmer, Bot. Gaz. 41: 317. 1906.

Orthocarpus castillejoideus var. *insalutatus* Jepson, Man. Fl. Pl. Calif. 944. 1925.

Orthocarpus sonomensis Eastw. Leaflets West. Bot. 2: 104. 1938.

Stem simple, erect, or with ascending or long decumbent branches from the base, 1–3 dm. high, the herbage pubescent. Leaves linear-lanceolate to oblong, very obtuse, usually entire, or with 1–3 pairs of lateral lobes, 1–5 cm. long; spike broad and congested, usually elongated but often subcapitate; bracts oblong to ovate in outline, palmately cleft into 3–7 oblong rounded

lobes, the middle one broadest, the upper ones tipped with yellow or sometimes purple; calyx 12–20 mm. long, subequally cleft about one-half its length into narrow lobes colored at tip; corolla yellow with purple markings, 14–25 mm. long, exceeding calyx, narrow throughout to rather ample, the lower lip shallow to rather deep, 4–6 mm. long not including the erect obtuse purple (or yellow) teeth 1–3 mm. long, somewhat exceeded by the straight galea.

Low saline ground near the coast, Humid Transition Zone; Vancouver Island to Monterey County, California. Type locality: California, probably San Francisco or Monterey. May–Aug. Widely variable in habit and coloring.

Orthocarpus castillejoideus var. *humboldtensis* Keck, Proc. Calif. Acad. IV. 16: 536. 1927. Bracts and calyx purple-tipped, the lobes of the bracts short and truncate; corolla purplish, the lower lip tipped with yellow, the teeth prominent. Salt marshes about Humboldt Bay, California. Type locality: Eureka, Humboldt County.

7. *Orthocarpus densiflorus* Benth. Owl's-clover. Fig. 4829.

Orthocarpus densiflorus Benth. Scroph. Indicae 13. 1835.

Orthocarpus noctuinus Eastw. Bull. Torrey Club 32: 211. 1905.

Stem erect, slender, often corymbosely branching above, 1–3.5 dm. high, puberulent, yellowish. Leaves linear or linear-lanceolate, attenuate, the lower entire, the upper with a pair of lateral lobes, 2–8 cm. long; spike dense, 2–10 cm. long, rather narrow, purplish; bracts equaling corollas, usually 3-lobed, the upper ones purple-tipped, finely pubescent; calyx about equaling throat of corolla; corolla purplish, the often yellowish lower lip with 3 prominent purple spots anteriorly, 10–25 mm. long, not exerted from the spike, the lower lip 3–4 mm. long, not as deep, the prominent erect purple teeth 1.5–2.5 mm. long, about equaling the puberulent subulate galea.

Grassy fields, Upper Sonoran Zone; Mendocino County to Los Angeles County, California, very rare in the Sierra Nevada foothills. Type locality: California. March–May.

Orthocarpus densiflorus var. *gracilis* (Benth.) Keck, Proc. Calif. Acad. IV. 16: 538. 1927. (*Orthocarpus gracilis* Benth. Scroph. Indicae 12. 1835; *O. Parishii* A. Gray, Proc. Amer. Acad. 17: 229. 1882.) Bracts equaling the throat of the corolla; corolla becoming exerted from the spike, the lower lip much inflated, conical or rounded, as deep as or deeper than long, often white. Santa Lucia Mountains, Monterey County, to Los Angeles County, and southern Orange and Riverside Counties to San Diego County, California, and northern Lower California. Type locality: Doubtless Santa Lucia Mountains.

Orthocarpus densiflorus var. *obispoensis* Keck, Proc. Calif. Acad. IV. 16: 539. 1927. Spike white, the corolla somewhat exerted from it, creamy white with few purple dots, the lower lip deeply saccate. Coastal San Luis Obispo County, California. Type locality: Morro.

8. *Orthocarpus purpurascens* Benth. Escobita. Common Owl's-clover. Fig. 4830.

Orthocarpus purpurascens Benth. Scroph. Indicae 13. 1835.

Orthocarpus purpurascens var. *Palmeri* A. Gray, Syn. Fl. N. Amer. 2: 300. 1878.

Stem erect, slender or moderately stout, often corymbosely branching from the base upward, 1–4 dm. high, usually anthocyanous, hirsute. Leaves deeply pinnatifid into several filiform involute-thickened divisions, these rarely again lobed, 1–5 cm. long; spike dense, 2–20 cm. long, pale to deep purple, usually very showy; bracts 1–2 cm. long, palmately 5–7-lobed, typically with greenish hirsute base, becoming greenish purple medianly, and the linear tips of the lobes densely velvety and rose-purple; calyx nearly equaling the bract and similarly hairy and colored; corolla scarcely exerted, crimson or purplish, the lower lip variously marked with purple, its tip often whitish or yellowish with purple dots at base of the small teeth, 12–30 mm. long, the lower lip rather shallow and inconspicuous to much inflated, densely puberulent, the slender galea exceeding lower lip 2–3 mm., more or less hooked at very tip over the prominent stigma, densely bearded with crimson velvety hairs.

Open fields, valleys and foothills, in various soils, mostly Upper Sonoran Zone; throughout the length of the Great Valley of California and in the Coast Ranges from southern Mendocino County to Lower California, east to Arizona and Sonora. Type locality: California. March–May. One of the important constituents in the spring wildflower displays, coloring hundreds of acres in many parts of the state.

Orthocarpus purpurascens var. *latifolius* S. Wats. Bot. King Expl. 458. 1871. (*Orthocarpus purpurascens* var. *multicaulis* Jepson, Man. Fl. Pl. Calif. 944. 1925.) Branches procumbent or ascending, or the stem simple; lobes of floral bracts usually broad and showy, tipped with lavender, pink, or greenish white and giving the spike a banded appearance; galea rich purple, the showiest part of the corolla. A polymorphous maritime variety mostly on old dunes from Humboldt County to San Luis Obispo County, California. Type locality: Noyo, Mendocino County.

Orthocarpus purpurascens var. *pallidus* Keck, Proc. Calif. Acad. IV. 16: 544. 1927. (*Orthocarpus exsertus* Heller, Muhlenbergia 1: 109. 1904.) Lower lip of corolla yellow or white. Southern San Luis Obispo County to western Riverside County, California, largely replacing the typical form in this area; occasional to San Diego. Type locality: Lincoln Park, near Pasadena.

Orthocarpus purpurascens var. *ornatus* Jepson, Man. Fl. Pl. Calif. 944. 1925. (*Orthocarpus venustus* Heller, Muhlenbergia 2: 141. 1906; *O. purpurascens* var. *venustus* Keck, Proc. Calif. Acad. IV. 16: 542. 1927.) Spike deep purple; corolla deep velvet red, the outer third of lower lip orange-yellow. Western Mojave Desert. Type locality: not given.

9. *Orthocarpus linearilobus* Benth. Pallid Owl's-clover. Fig. 4831.

Orthocarpus linearilobus Benth. Pl. Hartw. 330. 1839.

Orthocarpus mariposanus Congdon, Erythea 7: 188. 1899.

Stem erect, simple or with erect branches above, pubescent, like the foliage becoming obviously villous above, 1.5–3.5 dm. high. Leaves linear or nearly so, the lowermost entire, the upper pinnatisect with 2 or 3 pairs of nearly filiform lobes, 2–5 cm. long; spike dense, usually short and broad; bracts nearly equaling corolla, the long linear lobes pale purplish or yellowish tipped; calyx subequally 4-lobed; corolla cream-white or yellowish or the galea sometimes rose-lilac, 15–25 mm. long, pubescent, the gradually or abruptly dilated lower lip longer than deep,

yellow with 2 small purple dots at base and 3 larger ones toward summit, the subulate erect teeth small, with purple dot at base, about 1 mm. short of the pubescent galea.

Grassy hillsides, mostly Upper Sonoran Zone; Sierra Nevada foothills from Placer County to Kern County, rare northward to Shasta County, California. Type locality: in mountain pastures of the Sacramento region. April-June.

10. *Orthocarpus attenuatus* A. Gray. Narrow-leaved *Orthocarpus*. Fig. 4832.

Orthocarpus attenuatus A. Gray, Pacif. R. Rep. 4: 121. 1857.

Erect slender stem usually unbranched, 1-3.5 dm. high, the herbage canescent throughout. Leaves very narrowly linear-lanceolate, long-attenuate, the upper ones with a pair of filiform lobes, 2-6 cm. long; spike narrow but congested, elongated; bracts gradually becoming broader and shorter than the leaves, 15-20 mm. long, the 3 lobes whitish (sometimes purplish) at very tip; calyx nearly as long as corolla, the subequal lobes white-tipped; corolla whitish or sometimes purple-tinged, 10-25 mm. long, narrow throughout, the shallow lower lip purple-dotted at least at base and apex, with prominent erect teeth nearly equaling the subulate galea.

Grassy slopes and flats, Upper Sonoran Zone; Vancouver Island to northern Lower California; also in Chile. Type locality: Corte Madera, Marin County, California. April-May.

11. *Orthocarpus luteus* Nutt. Yellow *Orthocarpus*. Fig. 4833.

Orthocarpus luteus Nutt. Gen. 2: 57. 1818.

Orthocarpus strictus Benth. Scroph. Indicae 13. 1835.

Stem erect, slender, seldom branched, pilose and glandular-pubescent, 1-4 dm. high. Leaves hispidulous and glandular, linear-lanceolate, attenuate, 1.5-4 cm. long, usually entire, dark green and drying blackish; spike very narrow, loose below, bracts mostly 3-lobed, the central lobe lance-ovate, the small divergent lateral lobes only half as long; calyx half as long as corolla, the lobes deltoid-lanceolate, subequal; corolla golden yellow, scarcely exserted, 9-12 mm. long, glandular-pubescent except on the lower lip, the broad tube gradually expanding into the elongated shallow lower lip which is glabrous within, its soft blunt teeth ciliate, the broad cucullate galea minutely incurved apically, about equaling the lower lip.

Moist fields and meadows, Arid Transition and Canadian Zones; British Columbia, southward east of the Cascades to Mono and Fresno Counties, California; much commoner through the Rocky Mountains from Saskatchewan and the Dakotas to New Mexico. Type locality: "On the plains of the Missouri." July-Aug.

12. *Orthocarpus bracteosus* Benth. Rosy *Orthocarpus*. Fig. 4834.

Orthocarpus bracteosus Benth. Scroph. Indicae 13. 1835.

Orthocarpus bracteosus var. *albus* Keck, Proc. Calif. Acad. IV. 16: 554. 1927.

Stem erect, slender, simple or with appressed branches above, pubescent, somewhat glandular, 1-4 dm. high. Leaves linear-lanceolate, attenuate, 2-4 cm. long, the lower entire, the upper with a pair of very narrow lateral lobes; spike dense, elongated; bracts closely imbricated, obtuse or rounded at base, 3-cleft, the acuminate lateral lobes narrower, glandular-pubescent, somewhat hispid-ciliate, the uppermost tinged with purple; calyx green, 6-10 mm. long, hidden by the bracts; corolla rose-purple, somewhat exserted, 12-20 mm. long, the tube exceeding the calyx, gradually expanding into an ample puberulent toothless lower lip 5-7 mm. long, the broad pubescent galea scarcely exceeding the lower lip, and with a short inflexed papery beak.

Moist meadows, Transition Zones; Vancouver Island to Oregon mostly west of the Cascades, thence southward to the east of the Cascades to Plumas County, California. Type locality: Columbia River. June-July.

13. *Orthocarpus tenuifolius* (Pursh) Benth. Thin-leaved *Orthocarpus*. Fig. 4835.

Bartsia tenuifolia Pursh, Fl. Amer. Sept. 2: 429. 1814.

Orthocarpus tenuifolius Benth. Scroph. Indicae 12. 1835.

Orthocarpus linearifolius Benth. ex A. Gray, Proc. Amer. Acad. 19: 95. 1883.

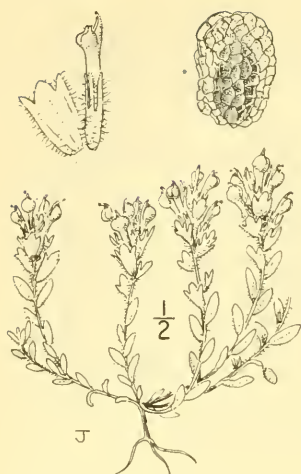
Stem erect, slender, simple or with appressed branches above, the herbage densely crisped-puberulent and becoming hispid-hirsute above, 1-3 dm. high. Leaves very narrow, tapering from the base or filiform throughout, the upper with 1 or 2 pairs of divergent filiform lobes; spike dense, cylindric; bracts closely imbricated, nearly concealing the flowers, chartaceous, 10-20 mm. long, the midlobe ovate or broadly oblong, obtuse or semicircular at apex, with a basal pair of divaricate lance-subulate lobes, prominently hispid-ciliate below, purple-tipped; calyx 7-12 mm. long; corolla yellow or apically tinged with purple, pubescent at least on the galea, 14-20 mm. long, the lower lip rather shallow, exceeded 1 mm. by the sharply hooked galea.

Open woods, meadows and prairies, Arid Transition Zone; southern British Columbia to eastern Oregon, east to Montana. Type locality: "On the banks of Clark's river." June-Aug.

14. *Orthocarpus barbatus* Cotton. Grand Coulee *Orthocarpus*. Fig. 4836.

Orthocarpus barbatus Cotton, Bull. Torrey Club 29: 574. 1902.

Stem erect, simple or with several appressed branches, pilose, 8-25 cm. high. Leaves scabrous-pubescent, entire or deeply 3- to 5-cleft with linear-attenuate lobes, 2-4 cm. long; spike yellowish green, the flowers nearly concealed by the closely imbricated bracts; bracts abruptly different from the leaves, papery, ovate, acute, puberulent, hispid-ciliate, 10-18 mm. long, 5-12 mm. wide, 3- or 5-cleft into lance-subulate lobes; calyx 8-9 mm. long; corolla yellow, 10-12 mm. long, the



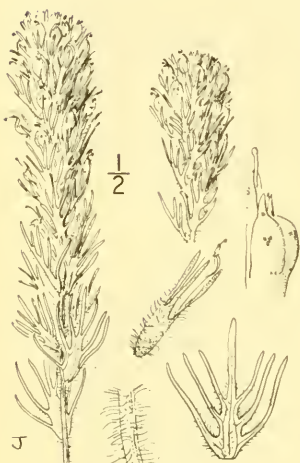
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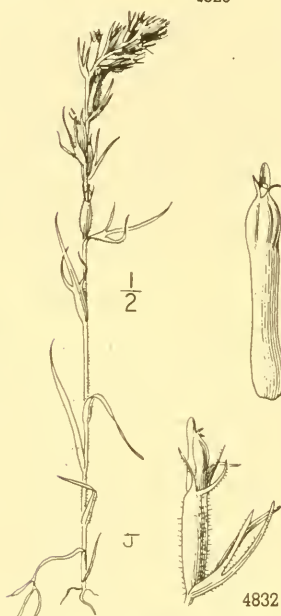
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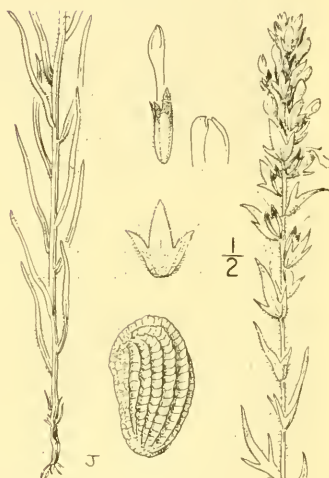
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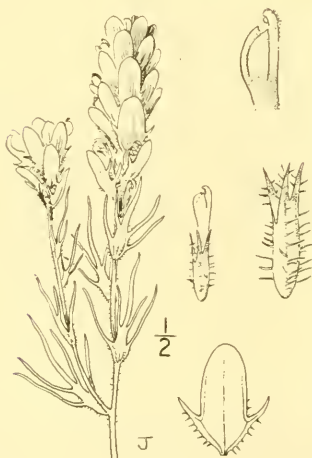
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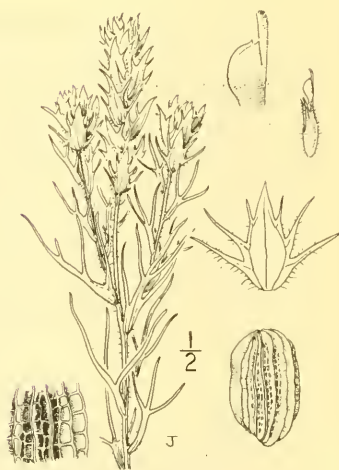
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4828. *Orthocarpus castillejoideus*
 4829. *Orthocarpus densiflorus*
 4830. *Orthocarpus purpurascens*

4831. *Orthocarpus linearilobus*
 4832. *Orthocarpus attenuatus*
 4833. *Orthocarpus luteus*

4834. *Orthocarpus bracteosus*
 4835. *Orthocarpus tenuifolius*
 4836. *Orthocarpus barbatus*

small lower lip glabrate, 4 mm. long, the teeth minute; galea straight, narrow, bearded at tip, extending beyond lower lip about 1.5 mm.

Sagebrush plains, Upper Sonoran Zone; central Washington south and east of the Columbia River. Type locality: "junction of Crab and Wilson creeks, Douglas [now in Grant] county." June.

15. *Orthocarpus cuspidatus* Greene. Broad-scaled *Orthocarpus*. Fig. 4837.

Orthocarpus cuspidatus Greene, Pittonia 4: 101. 1899.

Orthocarpus pachystachyus var. *cuspidatus* Jepson, Man. Fl. Pl. Calif. 945. 1925.

Stem erect, occasionally short-branched above, rather stout, canescent, 1–3.5 dm. high. Leaves deeply parted with a pair of narrow lateral divisions or the lowermost entire, linear to lanceolate, long-attenuate or caudate, 2–5 cm. long; spike subcapitate to elongated; bracts abruptly different from the leaves, broadly ovate-oblong with a basal pair of divaricate lobes, chartaceous, strongly veined, 12–20 mm. long, the midlobe 8–12 mm. wide, closely imbricated, purple-tipped; corolla rose-purple with white lower lip, much exceeding bracts, 20–25 mm. long, the prominent inflated lower lip 6–7 mm. long, shortly 3-toothed, exceeded 3–5 mm. by the arching galea which is decidedly pubescent at tip.

Open grassy hillsides, Transition Zones; southern Klamath and Jackson Counties, Oregon, to northern Siskiyou County, California. Type locality: Ashland Butte, Siskiyou Mountains, Oregon. June–July.

16. *Orthocarpus Copelandii* Eastw. Copeland's *Orthocarpus*. Fig. 4838.

Orthocarpus Copelandii Eastw. Bot. Gaz. 41: 288. 1906.

Stem erect, simple or corymbosely branched, finely canescent and viscidulous, 1–3.5 dm. high. Leaves entire or the upper with a pair of lateral lobes, linear to lanceolate, acuminate to caudate, 1–6 cm. long; spike dense, usually subcapitate; bracts abruptly different from the leaves, broadly oblong with a near-basal pair of divaricate attenuate lobes, becoming papery, strongly veined, 8–12 mm. long, the obtuse to subtruncate midlobe 5–8 mm. wide, closely imbricated, roseate-tipped, scabrid-puberulent, sparsely hispid-ciliate near base; corolla rose-purple with prominent white lower lip, 12–15 mm. long, the broad throat mostly exerted beyond the bracts, the inflated lower lip 4–6 mm. long, 3–4 mm. deep, minutely 3-toothed, the slightly curved pubescent galea exceeding the lower lip by 2–4 mm.

Open slopes, Canadian Zone; southern Jackson and Josephine Counties, Oregon, to western Glenn County, California. Type locality: Mount Eddy, Siskiyou County, California. July–Aug.

Orthocarpus Copelandii var. *cryptanthus* (Piper) Keck, Proc. Calif. Acad. IV. 16: 559. 1927. (*Orthocarpus cryptanthus* Piper, Smiths. Misc. Coll. 50: 200. 1907.) Spike elongated, flowers nearly hidden by the closely imbricated more chartaceous bracts; bracts 10–15 mm. long, the midlobe 6–10 mm. wide; corolla 10–12 mm. long, the lower lip 2 mm. deep. Canadian and Hudsonian Zones; Steen Mountains, Harney County, Oregon, through the Warner and Sierra Nevada Ranges to Mono County, California. Type locality: Steen Mountains.

17. *Orthocarpus pachystachyus* A. Gray. Shasta *Orthocarpus*. Fig. 4839.

Orthocarpus pachystachyus A. Gray, Syn. Fl. N. Amer. 2: 300. 1878.

Stem simple or branching above, rather stout, glandular-pubescent, 1.5–2.5 dm. high. Leaves entire or 3–5-lobed, scabrous, 1.5–3.5 cm. long; spike heavy, compact; bracts abruptly differing from leaves, broad, 3–7-lobed, rose-purple, 15–28 mm. long, the ovate-oblong midlobe 5–9 mm. wide, the divergent lateral lobes half as long as midlobe, finely scabrous and toward base ciliate; calyx parted nearly to base anteriorly, less than halfway posteriorly, each lobe bearing 2 lanceolate teeth 5–6 mm. long; corolla rose-purple, slightly exerted, 20–30 mm. long, the tube exceeding calyx, the lower lip glabrate with pubescent margin and teeth, the slender glabrate galea exceeding lower lip 2–3 mm., with conspicuous incurved tip.

Upper Sonoran Zone; Shasta Valley, California; rare. Type locality: plains of the Shasta River. June.

18. *Orthocarpus imbricatus* Torr. Mountain *Orthocarpus*. Fig. 4840.

Orthocarpus imbricatus Torr. ex S. Wats. Bot. King Expl. 458. 1871.

Orthocarpus olympicus Elmer, Bot. Gaz. 36: 60. 1903.

Stem erect, simple or corymbosely branched, puberulent, 1–3.5 dm. high. Leaves linear or linear-lanceolate, attenuate, entire, somewhat scabrid, 2–4 cm. long; spike short-cylindric or subcapitate, compact; bracts abruptly different from the leaves, entire or with 2 small lobes below the middle, ovate or broadly oblong, rounded or mucronate, finely puberulent, lower margin inconspicuously ciliate, purple-tipped, closely imbricated, 8–14 mm. long; calyx 4–6 mm. long, deeply cleft before and behind for two-thirds its length, the lobes bidentate with short acute teeth; corolla purple with partially white lower lip, partially concealed by the bracts, 10–13 mm. long, microscopically glandular-puberulent, the appressed lower lip shallowly saccate, the galea exceeding the lower lip 1 mm., its abruptly hooked tip glabrous and tubular-funnelform.

Dry slopes or glades, Canadian and Hudsonian Zones; Olympic Mountains, Washington; Cascade Mountains, Oregon, to Shasta and Humboldt Counties, California. Type locality: Cascade Mountains, Oregon. July–Aug.

19. *Orthocarpus erianthus* Benth. Butter-and-Eggs or Johnny-Tuck. Fig. 4841.

Orthocarpus erianthus Benth. Scroph. Indicae 12. 1835.

Orthocarpus Bidwelliae A. Gray, Proc. Amer. Acad. 15: 51. 1879.

Stem openly or strictly corymbosely branched from near the base upward, rarely simple, finely canescent and glandular, 5–35 cm. high. Leaves 1–5 cm. long, narrowly linear, pinnately



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4837. *Orthocarpus cuspidatus*
 4838. *Orthocarpus Copelandii*
 4839. *Orthocarpus pachystachyus*

4840. *Orthocarpus imbricatus*
 4841. *Orthocarpus erianthus*
 4842. *Orthocarpus faucibarbatius*

4843. *Orthocarpus pusillus*
 4844. *Orthocarpus floribundus*
 4845. *Castilleja arachnoidea*

divided into several divaricate filiform divisions, the herbage usually purplish; spike lax below, more congested and flat-topped above, the corollas well exserted; bracts divided into 4–10 linear divisions, exceeding the 5–8 mm. long calyx; corolla 10–25 mm. long, the long slender densely pubescent tube much exserted from the calyx, the lower lip abrupt, purplish at base of throat, the much inflated sacs light yellow, 3–4 mm. deep, the purplish teeth inconspicuous; galea purple-black, slightly curved, somewhat exceeding the lower lip, subulate.

Valley floors and open slopes, Sonoran Zones; California, very common through the Great Valley from Shasta County to northern Kern County and at low elevations from Mendocino County to San Benito County; rare southward to San Diego County. Type locality: California. March–May.

Orthocarpus erianthus var. *gratiòsus* Jepson & Tracy, Man. Fl. Pl. Calif. 941. 1925. Lower lip of corolla with middle lobe yellow, 2 lateral lobes white, purple band prominent around throat. At or near the coast, Humid Transition Zone; Curry County, Oregon, to northern Mendocino County, California. Type locality: Eureka.

Orthocarpus erianthus var. *roseus* A. Gray, Bot. Calif. 1: 578. 1876. (*Triphysaria versicolor* Fisch. & Mey. Ind. Sem. Hort. Petrop. 2: 52. 1836; *Orthocarpus versicolor* Greene, Man. Bay Reg. 283. 1894; *O. erianthus* var. *inopinus* Jepson, Man. Fl. Pl. Calif. 941. 1925.) Lower lip of corolla rose-pink or white turning rose-pink, 4–5 mm. deep. The common form along the coast from Mendocino County to San Francisco, rare southward to coastal San Luis Obispo County. Type locality: Noyo, Mendocino County.

Orthocarpus erianthus var. *micranthus* (A. Gray) Jepson, Man. Fl. Pl. Calif. 941. 1925. (*Orthocarpus Bidwelliae* var. *micranthus* A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 453. 1886; *O. micranthus* Greene ex Heller, Muhlenbergia 2: 251. 1906.) Herbage often more strongly anthocyanous; corolla 8–15 mm. long, the yellow lower lip only 1–2 mm. deep; stamens often free from the galea. Plains from Mariposa County to Kern County; also in San Benito and Monterey Counties. Type locality: plains of Fresno County.

20. *Orthocarpus faucibarbatùs* A. Gray. Smooth *Orthocarpus*. Fig. 4842.

Orthocarpus faucibarbatùs A. Gray, Pacif. R. Rep. 4: 121. 1857.

Orthocarpus erianthus var. *laevis* A. Gray, Syn. Fl. N. Amer. ed. 2. 2: 453. 1886.

Stem simple or corymbosely branched, stramineous, glabrous up to the puberulent inflorescence, 1–5 dm. high. Leaves 2–8 cm. long, linear-lanceolate, pinnately divided into filiform lobes; spike elongated, the corollas well exserted; bracts gradually differing from the leaves; corolla 12–22 mm. long, the very slender tube much exceeding the calyx, the abruptly inflated lower lip 2–4 mm. deep, pale sulphur yellow with a row of purple dots on each margin, bearded within, its teeth less than 1 mm. long; galea yellowish.

Valleys away from the immediate coast, Upper Sonoran Zone; California, from Mendocino County to San Francisco Bay. Type locality: Corte Madera, Marin County. April–May.

Orthocarpus faucibarbatùs subsp. *albidus* Keck, Madroño 5: 164. 1940. Lower lip of the corolla white fading rose, with a greenish yellow spot at the base of each tooth. Along the immediate coast from Lane County, Oregon, to Monterey County, California. Type locality: 3 miles south of the mouth of Russian River, Sonoma County, California. May–June.

21. *Orthocarpus pusillus* Benth. Dwarf *Orthocarpus*. Fig. 4843.

Orthocarpus pusillus Benth. Scroph. Indicae 12. 1835.

Orthocarpus densiusculus Gandoger, Bull. Soc. Bot. Fr. 66: 218. 1919.

Stem slender, with weak ascending branches from the base, 5–25 cm. high, the herbage hispidulous throughout and with a purplish cast. Leaves 1–3 cm. long, linear, the upper pinnatifid with filiform divisions; spike racemose, extending almost to base of plant; bracts 5–12 mm. long, once or twice pinnatifid with filiform revolute lobes, exceeding the corolla; calyx 5–7 mm. long, subequally 4-lobed; corolla 4–6 mm. long, dull brownish purple, sparingly hispidulous or glabrous, the slender tube abruptly swelling into the trisaccate lower lip 1 mm. long and barely 1 mm. deep, the broad galea minutely uncinately and exceeding lower lip 0.5–1 mm.

Grassy fields at low elevations, Upper Sonoran and Humid Transition Zones; British Columbia, southward west of the Cascades to San Luis Obispo County, California, and rare in the Great Valley of California from Butte County to Stanislaus County. Type locality: California. April–May.

22. *Orthocarpus floribundus* Benth. San Francisco *Orthocarpus*. Fig. 4844.

Orthocarpus floribundus Benth. Scroph. Indicae 12. 1835.

Stem openly corymbosely branching throughout, stramineous, glabrous to sparsely hispidulous, 1–3 dm. high. Leaves 1–4 cm. long, pinnatifid above with many filiform divisions; spike compact, short, the corollas exserted; bracts gradually differing from the leaves, the filiform lobes revolute, scabrid; corolla 9–12 mm. long, cream-colored, the slender glabrous tube exceeding the calyx, the abruptly inflated lower lip with 3 divergent spreading oblong sacs 2 mm. deep, pilose within, microscopically papillose without, the small erect teeth ciliolate; galea hyaline except for the midrib, broad, obtuse, slightly reflexed; stamens exserted from the galea and the open throat, the anthers recoiled.

Humid Transition Zone; a narrow endemic limited to Point Reyes Peninsula, Marin County, and San Francisco Peninsula as far south as San Mateo, San Mateo County, California. Type locality: probably San Francisco. April–May.

30. *CASTILLÈJA* Mutis ex L. f. Suppl. Syst. Veg. 47. 1781.

Erect perennial or annual herbs, with alternate leaves and (in ours) spike-like racemes of yellow-, purple-, or red-bracted flowers. Bracteoles none. Calyx of 4 lobes (the uppermost lost), or seemingly of 2 lobes (by fusion of those on each side). Corolla (in ours) greenish, 2-lipped, the upper lip galeate (its petals united to apex), the lower lip shorter and often rudimentary. Stamens 4, didynamous, the anther-cells unequally placed. Capsule

turgid, ovoid or cylindric-ovoid, glabrous, loculicidal. Seeds many, wingless, the loose testa reticulate. [Named in honor of Castillejo, a Spanish botanist.]

A genus of about 200 species, all of the New World, but one species extending to northern Asia. Type species, *Castilleja fissifolia* L.f., of Colombia.

Plant perennial; at least the upper bracts trifid, or rarely these all entire (in *C. disticha*, *C. franciscana*, and *C. latifolia*).

Sepals united little, if at all, farther dorsally than ventrally.

Lower corolla-lip usually pouch-like, from about half the length of to nearly equaling galea, its lobes distally thin, whitish (or wholly green in *C. cinerea* and *C. Culbertsonii*), and usually not incurved; leaf-blades mostly pinnatifid; corolla 15–25 mm. long.

Sepals joined little farther laterally than medianly, the free calyx-lobes linear to lance-attenuate; corolla 10–18 mm. long, its lower lip at least half the length of galea; plants cinereous to hirsute.

Lower lip of corolla distally thin and whitish, at least two-thirds the length of galea; calyx-lobes obtusish to attenuate; hairs of stem and leaves lax.

Stem, leaves, and inflorescence lanose with flexuous appressed matted hairs.

I. ARACHNOIDEAE.

Stem and leaves with distinct spreading hairs.

II. PILOSAE.

Lower lip of corolla wholly green and thickened to apex, about half the length of galea; calyx-lobes obtuse-rounded; stem and leaves grayish-hirsute.

III. CINEREA.

Sepals joined much farther laterally than medianly, the free calyx-lobes relatively short; lower lip of corolla evidently shorter than galea.

Calyx-lobes acute to obtusish (to sometimes rounded in *C. villicaulis*); leaves linear to linear-lanceolate, entire or with slender lobes; bracts yellowish (to vinaceous in *C. cryptantha*).

IV. PALLESCENTES.

Calyx-lobes rounded (to merely obtuse in *C. Lemmonii*); leaves usually wider, entire or with slender lobes; bracts yellow or purple.

V. CHRYSANTHAE.

Lower corolla-lip less than half the length of galea, green or blackish, thickened, its lobes minute and usually incurved.

Calyx cleft medianly more deeply than laterally, its lobes uniform; bracts colored, yellow, white, purple, or red.

Herbage green, not tomentose; leaves linear to ovate; calyx-lobes all distinct at apex, acute or obtuse, more rarely rounded.

Lower lip of corolla one-fifth to one-third length of galea.

Plant, below the inflorescence, glandular-pubescent (obscurely so in *C. levisecta*); bracts yellow or red.

VI. GLANDULIFERAE.

Plant, below the inflorescence, not glandular.

Stem with short reflexed hairs (to occasionally glabrous); bracts yellow or whitish, ascending-appressed; corolla 14–18 mm. long; leaves linear-lanceolate to lanceolate.

VII. SEPTENTRIONALES.

Stem with spreading hairs or glabrous; bracts red or purple (or yellow or whitish in a form of *C. orcopola*); corolla 10–30 mm. long.

Leaves linear-lanceolate, entire or sometimes with a pair of spreading lobes.

VIII. FRATERNAE.

Leaves lanceolate to obovate, all (above the lowermost) with a pair of slender usually falcate lobes. (*Chromosae*)

59. *C. orcopola*.

Lower lip of corolla less than one-fifth (or occasionally one-fourth) the length of galea.

Stems scattered, rising from slender rhizomes; bracts with sharply marked cross-band of yellow just proximal to scarlet or scarlet-red distal portion.

IX. SUKSDORFIANAE.

Stems normally clustered, the roots descending from the often woody crown; bracts with less sharply marked cross-band of yellow (except in *C. hispida abbreviata*) or this lacking.

Hairs simple or none.

Galea dorsally rather strongly pubescent; stems much-branched, suffrutescent or woody below.

Leaves oblong-lanceolate to orbicular, often thickened and relatively brittle; calyx-lobes rounded to abruptly acuminate; stems diffuse, ascending or erect.

X. LATIFOLIAE.

Leaves linear-lanceolate, thin, attenuate and often undulate; calyx-lobes lanceolate, acute to obtuse; stems erect.

XI. AFFINES.

Galea dorsally finely pubescent to puberulent; stems often simple, or branched only near base, not or only rarely suffruticose below.

Plant, below the inflorescence, evidently glandular-pubescent; bracts yellow or red.

Bracts dull yellow or reddish; corolla 15–20 mm. long, shorter than or somewhat exceeding the bracts. (*Glanduliferae*)

Bracts red or scarlet; corolla usually longer and clearly exceeding the bracts.

XII. DISTICHAE.

Plant, below the inflorescence, not or only obscurely glandular; bracts red, scarlet, or purple (yellow or whitish only in *C. neglecta* and in occasional color-forms of other species).

Main cauline leaves entire.

XIII. MINIATAE.

Main cauline leaves with 1 to several pairs of lobes.

XIV. CHROMOSAE.

Hairs branched; galea as long as or longer than the tube of the corolla; bracts distally red.

XV. PRUINOSAE.

Herbage grayish or white-tomentose, the hairs branched; leaves linear to oblong, obtuse or rounded, entire (or the uppermost lobed); plants shrubby below.

Calyx-lobes acute; galea dorsally strongly pubescent; bracts obovoid, entire or distally 3-toothed; leaves oblong, pale green; stem hirsute with mainly simple and gland-tipped hairs, but the leaves tomentose with shorter branched and mostly glandless hairs. (*Latifoliae*)

41. *C. mollis*.

Calyx-lobes rounded or wholly united laterally; galea dorsally puberulent; bracts linear or oblong, 3-lobed; leaves linear to linear-lanceolate, cinereous-whitened by the close glandless tomentum.

XVI. LANATAE.

Calyx cleft laterally more deeply than medianly, its lobes unequal, lanuginous, the upper pair linear-lanceolate and acute or obtuse, the lower pair much larger (usually both wider and longer) and broadly rounded; bracts green, against which contrast the yellow galeas of the corollas.

XVII. PLAGIOTOMAE.

Sepals united much farther dorsally than ventrally; corolla 30-45 mm. long, its lower lip less than one-fourth the length of galea; bracts distally scarlet-red, the inflorescence elongated and with relatively isolated flowers.

XVIII. LINARIAEFOLIAE.

Plant annual; leaves and bracts lanceolate-attenuate, entire, the younger bracts distally scarlet; calyx cleft evenly medianly more deeply than laterally; corolla yellow or reddish distally, the galea more than 4 times the length of the rudimentary but projecting lower lip.

XIX. STENANTHAE.

I. ARACHNOIDEAE.

Galea lanose-pubescent dorsally, its membranous margins narrow; pouch of the lower corolla-lip scarcely inflated; bracts dull yellow to reddish.

1. *C. arachnoidea*.

Galea puberulent or finely pubescent, its membranous margin at least one-third its width; pouch of lower corolla-lip inflated; bracts dull yellow to usually russet or dull reddish.

Pouch of lower corolla-lip somewhat inflated, less abruptly contracted to the pale free lobes; galea obtuse to acute; capsule 7-9 mm. long; leaf-segments linear.

2. *C. Payneae*.

Pouch of lower corolla-lip much inflated, very abruptly contracted to the yellow free lobes; galea attenuate; capsule 5 mm. long; leaf-segments filiform.

3. *C. filifolia*.

II. PILOSAE.

Membranous margins of galea yellowish-translucent throughout, its dorsal surface pubescent with glandless hairs; lips of corolla usually wholly exerted beyond calyx, the corolla yellowish, with the lower lip nearly as long as the galea; bracts with usually 2 pairs of lobes; stems ascending to erect, both stems and leaves hirsute-villose.

4. *C. psittacina*.

Membranous margins of galea proximally or wholly purple; lips of corolla partially or only tardily exerted beyond calyx, the corolla greenish.

Bracts distally widely rounded, narrowly whitish-margined, with 1 pair of lateral lobes (or sometimes also a distal shorter pair); galea pubescent dorsally with glandless hairs; plants 2-4 dm. tall, erect, the stem, leaves, and bracts villose-hirsute.

5. *C. pilosa*.

Bracts acute or acutish, or else narrowly rounded, distally or wholly yellowish or purple; plants 0.5-2.5 dm. tall, diffuse or ascending, the stems more finely villose-hirsute and the leaves and bracts pubescent.

Galea hairy to pubescent dorsally with glandless or slightly gland-tipped hairs, its membranous margins distally pale or white like the lobes of the lower corolla-lip; calyx nearly as long as the corolla, so that the corolla-lips are only partially, if at all, exerted; bracts light yellow to dull purplish, with 1 pair of lateral lobes (or sometimes also a distal shorter pair); plants 0.5-2.5 dm. tall.

6. *C. nana*.

Galea minutely puberulent, its membranous margins and the lobes of the lower lip all purple; calyx much shorter than the corolla, the lips of which are wholly exerted; bracts purple, with 2 full pairs of lateral lobes; plants 0.2-1 dm. tall.

7. *C. rubida*.

III. CINEREA.

Only species.

8. *C. cinerea*.

IV. PALLESCENTES.

Corolla 13-15 mm. long, the pouch of the lower lip only slightly inflated, puberulent to glabrescent.

Hairs of stem and leaves minute, reflexed-incurved to -appressed; calyx much shorter than corolla (reaching to pouch of lower lip), its lobes lance-attenuate, 1-1.5 mm. long; stem 1.5-2.5 dm. tall, stiff and often branched.

9. *C. oresbia*.

Hairs of stem and leaves spreading; calyx not or little shorter than corolla, its lobes ovate, 0.5-1 mm. long. Bracts and calyces yellowish; calyx-lobes shorter than wide, acutish to rounded; stems many, 1-2.5 dm. tall, densely white-villose.

10. *C. villicaulis*.

Bracts greenish to vinaceous-brown, against which contrast the yellow calyces; calyx-lobes as long as wide, acute to obtuse or slightly rounded; stems few or solitary, 1-1.5 dm. tall, somewhat villose-hirsute.

11. *C. cryptantha*.

Corolla 17-25 mm. long; calyx little shorter than corolla (usually reaching to lobes of lower lip), its lobes short and triangular-ovate.

Pouch of lower lip and the galea finely pubescent, the former dark green and somewhat inflated; leaf-blades and -segments filiform-linear; stem 1-2 dm. tall, diffusely ascending-erect, the herbage with reflexed hairs.

12. *C. pallescens*.

Pouch of lower lip and the galea puberulent to nearly glabrate, the former paler and scarcely inflated; leaf-blades wider; stem usually taller, the herbage pilose-pubescent with spreading hairs.

Stem and leaves finely pubescent, the former mostly 3-6 dm. tall, the latter linear or linear-lanceolate with mid-blade mostly 1-1.5 mm. wide; bracts relatively narrow and leaf-like, the mid-blade 3-4 mm. wide, acutish or acute, and usually with 2 pairs of narrowly linear lobes; pouch of lower corolla-lip purplish.

13. *C. cervina*.

Stem and leaves hirsute, the former mostly 1.5-3 dm. tall, the latter broadly linear with mid-blade mostly 1.5-3.5 mm. wide; bracts relatively wide, the mid-blade 3.5-5 mm. wide, obtusish to rounded, and usually with 2 pairs of linear or widely linear lobes; pouch of lower corolla-lip pale yellowish green to slightly purplish.

14. *C. Thompsonii*.

V. CHRYSANTHAE.

Bracts yellowish, rounded at apex, exceeding or about equaling the corollas; galea puberulent to finely pubescent with glandless or finely gland-tipped hairs; leaves many, ascending, mostly with linear-attenuate lobes.

15. *C. Cusickii*.

Bracts evidently exceeded by the corollas (only slightly so in *C. Ownbeyana*); galea, if pubescent, with gland-tipped hairs.

Leaves oblong-lanceolate, obtuse, usually with a pair of lobes; stem, and margins and ribs of leaves and bracts, hirsute with stiffly spreading yellow hairs and also with some gland-tipped ones; calyx-lobes free laterally 2-3 mm. (*Glanduliferae*)

16. *C. xanthotricha*.

Leaves linear-lanceolate to lanceolate, attenuate, entire or the upper sometimes with a pair of lobes; stem and leaves with laxly spreading glandless white hairs (or these obscurely gland-tipped in *C. Lemmonii*); calyx-lobes shorter.

- Bracts and sepals distally pale yellow; galea dorsally glabrescent to glabrous; leaves lanceolate; stem, and leaves proximally, finely villose. 16. *C. chrysantha*.
- Bracts and sepals distally purple to whitish; galea dorsally puberulent to pubescent with gland-tipped hairs. 17. *C. Ownbeyana*.
- Leaves and bracts relatively wide, grayish-villose, the former lanceolate; flowers little exceeding the foliose bracts; stems diffusely ascending. 17. *C. Ownbeyana*.
- Leaves and bracts narrow, finely villose, the former linear-lanceolate; flowers much exceeding the short bracts; stems erect from a decumbent base. 18. *C. Lemmonii*.
- Lobes of lower corolla-lip purple to white, distinct 1.5–2.5 mm.; galea finely pubescent with gland-tipped hairs; corolla 20 mm. long, exceeding the calyx, even the ample dark green pouch of the lower lip exerted; stems many in a clump. 18. *C. Lemmonii*.
- Lobes of lower corolla-lip scarcely developed, green, the pouch dark purplish green; galea glandular-puberulent to glabrescent; corolla smaller, more tardily exerted from the ampler calyx; stems few or solitary. 19. *C. Culbertsonii*.

VI. GLANDULIFERAE.

- Calyx-lobes broadly rounded; leaves oblong-lanceolate, one-fifth to one-third as wide as long, distally with 1 to 3 pairs of short lobes. 20. *C. levisecta*.
- Bracts distally yellow, the lower 2.5–3 cm. long, both bracts and leaves distally with 2 or 3 pairs of slender acute or acutish lobes; corolla 18–20 mm. long; stigma 1–1.3 mm. wide; plant 2.5–3.5 dm. tall, obscurely glandular. 20. *C. levisecta*.
- Bracts distally scarlet-red, the lower 1–1.5 cm. long, both bracts and leaves distally with 1 or 2 pairs of obtuse or rounded lobes; corolla 15–16 mm. long; stigma 0.2–0.3 mm. wide; plant 1–1.5 dm. tall, more evidently glandular. 21. *C. brevilibata*.
- Calyx-lobes acute to obtuse; leaves usually narrower in proportion to length. 22. *C. Elmeri*.
- Inner bracts broadly rounded; leaves and outer bracts entire; corolla 20 mm. long. 22. *C. Elmeri*.
- Inner bracts less widely rounded, usually acute or truncate; leaves and bracts with slender acute to attenuate lobes. 23. *C. chlorotica*.
- Bracts dull yellow or reddish; galea dorsally glandular-puberulent, the hairs mostly or all gland-tipped. 23. *C. chlorotica*.
- Lower corolla-lip one-third length of galea; leaves 1.5–2.5 cm. long. 24. *C. xanthotricha*.
- Stem and leaves finely glandular-pubescent, the hairs on the lower part of the stem somewhat longer; galea stout, decurved. 24. *C. xanthotricha*.
- Stem and leaves hirsute with glandless hairs as well as pubescent with shorter gland-tipped ones; galea slender, nearly straight. 25. *C. glandulifera*.
- Lower corolla-lip one-sixth to one-fourth length of the slender galea; leaves 1.5–5 cm. long; stem and leaves glandular-pubescent, or the stem often hirsute below. 25. *C. glandulifera*.
- Bracts bright red; lower corolla-lip one-fifth to one-third the length of galea. 26. *C. Wherryana*.
- Galea dorsally glandular-puberulent, relatively slender; leaves lanceolate, acute; plant 3–4 dm. tall, hirsute, with glandless and also with shorter gland-tipped hairs. 26. *C. Wherryana*.
- Galea dorsally with glandless or nearly glandless hairs, relatively stout; leaves oblong-lanceolate and obtuse to mostly lance-attenuate; plant 1–2 dm. tall, with similar or with less differentiated indumentum. 27. *C. Breweri*.

VII. SEPTENTRIONALES.

- Bracts yellow or yellowish, at least the mid-blade rounded at apex; usually only the distal part of the galea exceeding the subtending bracts; inflorescence villose with yellow hairs. 28. *C. lutescens*.
- Inflorescence dense, becoming 5–10 cm. long; leaves linear-lanceolate to lanceolate; stem and leaves densely pubescent, the former stout, 3–5 dm. tall. 28. *C. lutescens*.
- Inflorescence slender, usually shorter or more open; leaves linear-lanceolate, often narrowly so; stem and leaves finely pubescent to glabrous, the former slender, 2–4 dm. tall. 29. *C. septentrionalis*.
- Bracts pale or whitish, the mid-blade attenuate to narrowly rounded; both lips of corolla usually exerted beyond calyx and subtending bract; inflorescence villose-pubescent with white hairs. 30. *C. rustica*.

VIII. FRATERNAE.

- Corolla 12–15 mm. long, its lower lip somewhat hidden by the calyx; stem erect or somewhat decumbent at base, 1–2 dm. tall. 31. *C. taedifera*.
- Stem and leaves hirsute-pubescent; bracts scarlet, not exceeded by the thick blunt corolla-galeas. 31. *C. taedifera*.
- Stem and leaves glabrous to minutely pubescent; bracts purple, exceeded by the slenderly attenuate corolla-galeas. 32. *C. wallowensis*.
- Corolla 23–33 mm. long, its lower as well as upper lip usually exerted from the calyx; bracts red; stem diffuse, usually about 1 dm. tall, loosely hirsute. 33. *C. fraterna*.

IX. SUKSDORFIANAE.

Only species.

34. *C. Suksdorfii*.

X. LATIFOLIAE.

- Hairs of leaves and stems simple; calyx-lobes rounded to abruptly acuminate; corollas exceeding the colored bracts. 35. *C. mendocinensis*.
- Leaves oblong to orbicular, rounded, less than thrice as long as wide; bracts and calyces scarlet-red to scarlet, distad to the yellow crossband; plant hirsute or villose-hirsute with glandless hairs, diffusely spreading. 35. *C. mendocinensis*.
- Bracts all 3-lobed, the mid-lobe rounded and the lateral ones diverging about 45°; corolla 29–32 mm. long, its lower lip often spreading and the stout galea projecting 7–12 mm. beyond the calyx; plant villose-hirsute, the leaves mostly 1.3–2.5 cm. long and the depressed stems slightly woody. 35. *C. mendocinensis*.
- Bracts not (or scarcely) lobed, truncately rounded; corolla 24–27 mm. long, its lower lip appressed and the relatively slender galea projecting 4–5 (–10) mm. beyond the calyx; plant more stiffly hirsute, the leaves mostly 1–2 cm. long and the diffuse or erect stems thicker and quite woody. 36. *C. latifolia*.
- Leaves oblong-lanceolate, at least thrice as long as wide; bracts and calyces yellow or red, the bracts all deeply trifid; plant slightly to moderately pubescent or hirsute-pubescent, ascending to erect. 36. *C. latifolia*.
- Herbage, below the inflorescence, not glandular; plant loosely hirsute-pubescent to glabrous; bracts scarlet. 37. *C. litoralis*.
- Calyx-tube not inflated, light yellowish green, cleft laterally much less than medianly; leaves thick, oblong-lanceolate to widely oblong, finely (or rarely coarsely) pubescent to glabrous, those of the axillary shoots little or not developed. 37. *C. litoralis*.

Calyx-tube somewhat inflated, less strongly angled, pale yellow, cleft laterally little less than medianly; leaves apparently thin, oblong-lanceolate to narrowly oblong, grayish-pubescent, those of the axillary shoots usually so developed as to make the plant densely leafy.

38. *C. inflata*.

Herbage, below the inflorescence, with gland-tipped hairs interspersed sparingly to abundantly among the glandless ones; plant more uniformly hairy; bracts yellow to red; leaves of abbreviated shoots much developed.

39. *C. Wightii*.

Hairs of leaves branched, those of the stem mostly simple and many gland-tipped; calyx-lobes acute; corolla about equaling the green or greenish bracts.

40. *C. mollis*.

XI. AFFINES.

Only species.

41. *C. affinis*.

XII. DISTICHAEE.

Corolla less than twice as long as the calyx, its galea green or yellowish green; inflorescence relatively dense; bracts with 1 or 2 pairs of lobes.

Calyx-lobes obtuse to usually rounded; corolla usually 25–35 mm. long, the stout galea conspicuously exerted; leaves linear to oblong-lanceolate, entire or the upper deeply trifid.

42. *C. gyroloba*.

Calyx-lobes acute to attenuate; corolla usually 20–30 mm. long and with less conspicuously exerted galea. Lobes of calyx not or scarcely longer than wide, 0.5–2 mm. long, ovate or wider.

Leaves lanceolate or widely lanceolate, undulate, densely villose-pubescent; plant less densely glandular, the gland-tipped hairs mostly hidden by the villose glandless hairs.

43. *C. Martinii*.

Leaves linear-lanceolate, plane or somewhat undulate, shortly hispid-pubescent (especially ciliate); plant more densely glandular-pubescent, especially with short hairs on leaf-surfaces.

44. *C. Ewanii*.

Lobes of calyx much longer than wide, 2–4 mm. long, linear or lanceolate; leaves linear-lanceolate, wavy-margined.

45. *C. Applegatei*.

Corolla about twice as long as the calyx (its lips both exerted), 27–31 mm. long, the galea ochraceous or orange; flowers less crowded; bracts entire or with 1 pair of lobes.

46. *C. disticha*.

XIII. MINIATAE.

Leaves lanceolate (or, if narrower, then plant glabrous), attenuate, clearly 3-ribbed throughout length; plant glabrous or pilose.

Bracts acute, sharply toothed, distally scarlet to purple-red.

Leaves oblong, pubescent; corolla 40–45 mm. long; stems lax.

47. *C. oblongifolia*.

Leaves linear-lanceolate to lanceolate, glabrous or pilose (occasionally more pubescent in *C. miniata*); corolla smaller; stems erect.

Stem relatively stout, mostly 2.5–3.5 mm. in diameter (but varying from 2 to 6 mm.); bracts and calyces distally scarlet to red (rarely to red-purple); corolla 20–35 mm. long.

48. *C. miniata*.

Stem relatively slender, mostly 1.5–2 mm. in diameter (but varying to 3 mm.); bracts and calyces distally purple, varying to pale or even ochraceous; corolla 12–25 mm. long.

49. *C. elata*.

Bracts, at least the outer, obtuse or rounded, purple-red to red.

Stems erect, strongly tufted, 2–4 dm. tall; bracts and calyces purple-red, the calyx-lobes distinct laterally 3 mm.; corolla 19–22 mm. long.

50. *C. oregonensis*.

Stems decumbent-ascending, less tufted, 3–6 dm. tall; bracts and calyces pale to bright orange or vermilion, the calyx-lobes distinct laterally 3–6 mm.; corolla 25–30 mm. long.

51. *C. Dixonii*.

Leaves linear to linear-lanceolate (sometimes wider in *C. Peckiana*), usually obscurely or not 3-ribbed distally; plant hirsute or hispid-pubescent.

Lower corolla-lip green, appressed or incurved; corolla 15–25 mm. long; apex of calyx not upcurved; inflorescence dense, up to 12 cm. long; leafy abbreviated branches little or not developed.

Calyx-lobes free 5–8 mm., linear-attenuate; leaves linear-lanceolate.

52. *C. Peckiana*.

Calyx-lobes free 2–5 mm., lanceolate to oblong, acute to obtuse; leaves wider. (*Chromosae*)

57b. *C. hispida acuta*.

Lower corolla-lip dark green or usually becoming dark brown, spreading; corolla 15–45 mm. long; apex of calyx usually upcurved; inflorescence more slender and elongated, usually becoming 15–30 mm. long; leafy abbreviated branches usually somewhat developed.

53. *C. californica*.

XIV. CHROMOSAE.

Corolla less than twice as long as the calyx, usually only the distal part of the galea exposed; plants usually 3–5 dm. tall.

Mid-blade of leaf linear to lanceolate, usually with widely spreading lobes proximally as well as about the middle.

Stem and leaves hirsutulous to hirsute, the former sometimes glabrescent, greenish to brown-purple.

Bracts scarlet to red; corolla 15–30 mm. long; plant pilose to hirsute.

Main leaves entire or with a single pair of lobes, the mid-lobe acute to obtuse; inflorescence elongated, usually becoming 20–30 mm. long; leafy abbreviated branches somewhat developed. (*Miniatae*)

53. *C. californica*.

Main leaves with 1–3 pairs of lobes, the basal portion wider and the mid-lobe acutish to rounded; inflorescence relatively short (probably not over 15 cm. long); leafy abbreviated branches not developed.

54. *C. Douglasii*.

Bracts yellow; corolla 15 mm. long; stem and leaves hirsutulous; stems lax, becoming woody below.

55. *C. neglecta*.

Stem and leaves hispid-hirsute with stiffly spreading hairs, the former usually violet-purple; bracts scarlet.

56. *C. chromosa*.

Mid-blade of leaf wider, distally or about the middle with 1 to 3 pairs of ascending or ascending-spreading lobes.

Bracts and calyces distally scarlet; stem and leaves hirsute or pilose with spreading hairs, the leaves usually distally lobed; plant not or little blackening in drying.

57. *C. hispida*.

Bracts and calyces distally purple to red, or else whitish; stem and leaves glabrous, or slightly pilose with weak short hairs, the leaves usually lobed from the middle; plant much blackening in drying.

58. *C. oreopola*.

Corolla about twice as long as the calyx, its galea usually wholly exposed; bracts and calyces distally scarlet-red; leaves deeply cleft from below the middle with usually 2 pairs of slender lobes; stem and leaves finely pilose; plants 1-2 dm. tall. 59. *C. rupicola*.

XV. PRUINOSAE.

Calyx-lobes ovate, obtuse to acutish; lower corolla-lip dark green or blackish; leaves entire or usually with 1 or 2 pairs of lobes. 60. *C. Gleasonii*.

Calyx-lobes lanceolate to lance-attenuate; lower corolla-lip green; leaves usually entire, but the upper sometimes with a pair of lobes. 61. *C. pruinosa*.

XVI. LANATAE.

Corolla 18-21 mm. long, green or greenish, its lower lip hidden within calyx and less than one-third the length of galea; bracts scarlet; stems shrubby and thickened below, densely branched and foliose, the flowering shoots relatively long; indumentum whitened.

Hairs of tomentum spreading, conspicuously branched, those on the leaves pilosely disposed; calyx-lobes distinct laterally 5 mm. or less, or else wholly united; lower corolla-lip less than one-fifth the length of galea; plant mostly 3-6 dm. tall. 62. *C. foliolosa*.

Hairs of tomentum much finer, arachnoid-lanose, inconspicuously branched, densely matted and somewhat appressed on leaves as well as stems; calyx-lobes wholly united laterally; lower corolla-lip usually about one-fourth the length of galea; plant 2-4 dm. tall. 63. *C. hololeuca*.

Corolla 15 mm. long, dull yellow, its lower lip well exerted and about two-thirds the length of galea; bracts green or brownish green; stems shrubby and uniformly branched most of length, the flowering shoots short; indumentum cinereous, of intricately matted short stellate hairs. 64. *C. grisea*.

XVII. PLAGIOTOMAE.

Only species.

65. *C. plagiotoma*.

XVIII. LINARIAEFOLIAE.

Bracts (except sometimes the lowermost) deeply lobed; stem hirsute near base, then glabrous (or sparsely pubescent) distally to the hirsute inflorescence; free calyx-lobes lanceolate or linear, attenuate; galea of corolla greenish. 66. *C. linariaefolia*.

Bracts entire (lanceolate) or else only distally lobed; stem loosely hirsute to pilose or glabrous; galea yellowish.

Leaves and bracts attenuate to acute tips, the former linear; free calyx-lobes linear-lanceolate to lanceolate; galea slenderly attenuate. 67. *C. subinclusa*.

Leaves and bracts obtuse, the former linear-lanceolate to lanceolate; free calyx-lobes lanceolate to ovate; galea stout and evidently obtuse-tipped. 68. *C. franciscana*.

XIX. STENANTHAE.

Bracts attenuate-acute; lower corolla-lip greenish yellow (or rarely distally dark red).

Corolla becoming 25-35 mm. long, most of the galea exerted and the lower lip sharply projecting; leaves linear or linear-lanceolate; plant hirsute with spreading glandless hairs interspersed among shorter and denser glandular ones. 69. *C. stenantha*.

Corolla 15-20 mm. long, only the distal half of the galea exerted and the lower lip ascending or ascending-appressed; leaves linear-lanceolate to lanceolate; plant more strongly glandular-pubescent, the glandless and longer-spreading hairs relatively fewer. 70. *C. exilis*.

Bracts obtuse to acutish; lower corolla-lip purple-red; corolla 23-28 mm. long, the galea and the ascending lower lip usually mostly exerted. 71. *C. spiralis*.

1. *Castilleja arachnoidea* Greenm. Cobwebby Indian Paint-Brush. Fig. 4845.

Castilleja arachnoidea Greenm. Bot. Gaz. 53: 510. 1912.

Orthocarpus pilosus var. *arachnoideus* Jepson, Man. Fl. Pl. Calif. 940. 1925.

Castilleja Eastwoodiana Pennell, Notulae Naturae No. 74: 1. 1941.

Castilleja floccosa Pennell ex Peck, Man. Pl. Oregon 664. 1941.

Plant perennial, arachnoid-lanate, the stems clustered, 1-3 dm. tall, simple or branched. Leaves less hairy, linear-lanceolate, with 1 or 2 pairs of linear-attenuate widely spreading lobes; bracts and calyces distally yellow, or the tips dull reddish; calyx 12-14 mm. long, cleft medianly over one-half its length, laterally slightly less deeply into lance-linear lobes; corolla 10-12 mm. long, its galea 3-4 mm. long, dorsally lanose-pubescent, and the thin margins pale and narrow, its lower lip slightly shorter, proximally forming a low finely lanose-pubescent green trisaccate pouch, the short lobes pale yellow; capsule 8-9 mm. long.

Rocky granitic soil, Canadian and Hudsonian Zones; Klamath Mountains of southwestern Oregon and northwestern California. Type locality: near Marble Mountain, Siskiyou County, California. July-Aug.

Castilleja arachnoidea subsp. *schizotricha* (Greenm.) Pennell. (*Castilleja schizotricha* Greenm. Bot. Gaz. 53: 511. 1912; *Orthocarpus schizotrichus* Jepson, Man. Fl. Pl. Calif. 940. 1925.) Plant 0.8-1 dm. tall, the leaves entire or distally with a pair of lobes, the indumentum of plant and corolla with more evidently branched hairs. On decomposed marble, Marble Mountains, northwestern California. Type locality: Wooley Creek, Siskiyou County, California. July-Aug.

Castilleja arachnoidea subsp. *shastensis* (Eastw.) Pennell, Proc. Acad. Phila. 99: 177. 1947. (*Castilleja shastensis* Eastw. ex Baker, West Amer. Pl. 3: 4. 1904. Nomen nudum.) Bracts and calyces distally dull red, as are the lower lobes of the corolla, the bracts less appressed, ascending-spreading, and the inflorescence less woolly. Open sandy soil, presumably at similar elevations; Mount Shasta and Scott Mountains, Siskiyou County, California. Type locality: Mount Shasta, 7,000 feet altitude. July-Aug.

2. *Castilleja Payneae* Eastw. Pumice Indian Paint-brush. Fig. 4846.

Castilleja Payneae Eastw. Leaflets West. Bot. 2: 245. 1940.

Castilleja pumicicola Pennell, Notulae Naturae No. 74: 3. 1941.

Plant perennial, arachnoid-lanate, the clustered stems 1-2 dm. tall, simple or branched. Leaves less hairy, linear-lanceolate, with 1 or 2 pairs of widely spreading linear lobes; bracts and calyces distally pale greenish yellow to dull red or dull orange-red; calyx 12-14 mm. long, cleft medianly about one-half its length, laterally slightly less deeply into widely linear obtuse lobes; corolla 12-14 mm. long, its galea 4-6 mm. long, dorsally minutely pubescent, and the

thin pale or reddish margins about half the width of the galea; its lower lip shorter, proximally forming a minutely pubescent purplish trisaccate pouch, the short lobes whitish or pale yellow; capsule 7-9 mm. long.

Gravelly pumice or granitic soil, Canadian Zone to Arctic-Alpine Zone; open mountains, Cascade Mountains of Oregon (from The Sisters southward) south to Warner Mountains and Lassen Peak in northern California. Type locality: Mount Warren, Warner Mountains, Modoc County, California. June-Aug.

3. *Castilleja filifolia* Eastw. Thread-leaved Indian Paint-brush. Fig. 4847.

Castilleja filifolia Eastw. Leaflets West. Bot. 2: 243. 1940.

Plant perennial, arachnoid-lanate, the clustered stems 0.5-2.5 dm. tall, simple. Leaves less lanate, narrowly linear, with a pair of widely spreading filiform-linear lobes; bracts and calyces distally dull purple; calyx 10-15 mm. long, cleft medianly about one-half length, and laterally about as deeply into linear lobes; corolla 13-15 mm. long, its galea 4-6 mm. long, attenuate, dorsally slightly puberulent, the thin margins narrow, its lower lip slightly shorter, proximally forming a pubescent green trisaccately inflated pouch, thence abruptly contracted to the short yellow lobes; capsule 6 mm. long.

Openings in coniferous forest or on mountain summits, Canadian and Hudsonian Zones; southern Cascade Mountains, Douglas County, Oregon. Type locality: 8 miles north of Diamond Lake, Douglas County. June-July.

4. *Castilleja psittacina* (Eastw.) Pennell. Parrot's Head Indian Paint-brush. Fig. 4848.

Orthocarpus psittacinus Eastw. Bull. Torrey Club 29: 78. 1902.

Castilleja pratensis Heller, Muhlenbergia 2: 139. 1906.

Castilleja steenensis Pennell, Notulae Naturae No. 74: 4. (February) 1941.

Castilleja ochracea Eastw. Leaflets West. Bot. 3: 91. (November) 1941.

Plant perennial, villose-hirsute with glandless hairs, the clustered stems 1.5-3.5 dm. tall, simple or branched. Leaves linear or linear-lanceolate, with usually 2 pairs of divaricate slender lobes; bracts and calyces distally yellowish or yellow, the former whitish on the abruptly spreading tips; calyx 12-20 mm. long, cleft medianly about one-half its length, and laterally nearly as deeply into linear or lance-attenuate lobes; corolla 16-21 mm. long, its galea 4-6 mm. long, attenuate, pale yellowish green, dorsally finely pubescent, the thin margins pale; its lower lip slightly shorter, proximally forming a pubescent trisaccate pouch, the white appressed lobes 2-2.5 mm. long and each with dark midvein; capsule 7-8 mm. long.

Sandy or gravelly soil, among sagebrush, Arid Transition Zone; plateau of eastern Oregon (from Grant County southward) and northeastern California (to Plumas County). Type locality: Warner Mountains, Oregon. May-July.

5. *Castilleja pilosa* (S. Wats.) Rydb. Hairy Indian Paint-brush. Fig. 4849.

Orthocarpus pilosus S. Wats. Bot. King Expl. 231. 1871.

Castilleja pilosa Rydb. Mem. N.Y. Bot. Gard. 1: 361. 1900.

Castilleja Jusselii Eastw. Leaflets West. Bot. 2: 243. 1940.

Plant perennial, villose-hirsute with glandless hairs, the clustered stems 2-4 dm. tall, branched and very leafy. Leaves linear or nearly so, entire or the upper, or sometimes most, with a pair of slender lobes; bracts and calyces distally white-margined, the former with a pair of ascending-spreading lobes; calyx 15-16 mm. long, cleft medianly and laterally nearly one-half length into linear lobes; corolla 17-22 mm. long, its galea 7-8 mm. long, acutish, dorsally greenish and finely pubescent, ventrally the wide thin margins proximally dark purple and distally white, its lower lip 1-1.5 mm. shorter, proximally forming a finely pubescent to glabrous, greenish and slightly saccate pouch, distally whitish, with the ovate white lobes semiappressed; capsule 9 mm. long.

Open granitic soil, Arid Transition Zone; crest and eastern slope of Sierra Nevada from Plumas County to Mono County, California, and in adjacent Nevada. Type locality: Wasboe Valley, Nevada. June-Aug.

6. *Castilleja nana* Eastw. Dwarf Alpine Indian Paint-brush. Fig. 4850.

Castilleja nana Eastw. Proc. Calif. Acad. III. 2: 289. 1902.

Castilleja inconspicua Nels. & Kenn. Proc. Biol. Soc. Wash. 19: 38. 1906.

Castilleja ambigua M. E. Jones, Contr. West. Bot. No. 12: 68. 1908. Not Hook. & Arn. 1833.

Orthocarpus pilosus var. *monensis* Jepson, Man. Fl. Pl. Calif. 940. 1925.

Plant perennial, villose-pubescent with glandless hairs, the many clustered stems 0.5-2.5 dm. tall, simple or little-branched. Leaves nearly linear, nearly all with 1 pair of divaricate acute lobes; bracts and calyces distally dull yellow or dull purplish red, the former with a pair of slender lobes; calyx 15 mm. long, cleft medianly about one-half the length, laterally somewhat less deeply into linear-lanceolate lobes; corolla 13-16 mm. long, its galea 6 mm. long, acute, dorsally greenish and finely pubescent (distally merely puberulent), ventrally the wide thin margins proximally dark purple and distally white, its lower lip scarcely shorter (about 0.5 mm.), proximally forming a slightly pubescent, greenish and scarcely inflated pouch, distally the ovate white lobe semiappressed; capsule 10 mm. long.

Stony granitic soil, Arctic-Alpine Zone; Sierra Nevada, from Eldorado County to Tulare County, California, eastward on mountain ranges of western Nevada. Type locality: Harrison's Pass, California. June-Aug.



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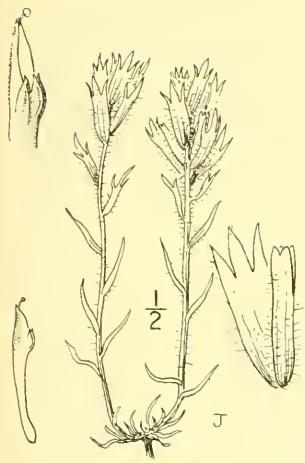


4854

4846. *Castilleja Paysonae*
 4847. *Castilleja filifolia*
 4848. *Castilleja psittacina*

4849. *Castilleja pilosa*
 4850. *Castilleja nana*
 4851. *Castilleja rubida*

4852. *Castilleja cinerea*
 4853. *Castilleja oresbia*
 4854. *Castilleja villicaulis*



4855



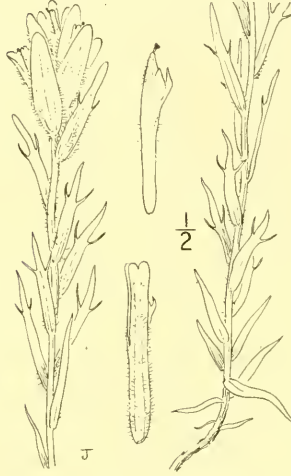
4856



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4860



4861



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4855. *Castilleja cryptantha*
 4856. *Castilleja pallescens*
 4857. *Castilleja cervina*

4858. *Castilleja Thompsonii*
 4859. *Castilleja Cusickii*
 4860. *Castilleja chrysantha*

4861. *Castilleja Ownbeyana*
 4862. *Castilleja Lemmonii*
 4863. *Castilleja Culbertsonii*

7. *Castilleja rubida* Piper. Little Reddish Indian Paint-brush. Fig. 4851.

Castilleja rubida Piper, Bull. Torrey Club 27: 398. 1900.

Plant perennial, closely pubescent with glandless hairs, the clustered stems 0.2–1 dm. tall, simple, villous in inflorescence. Leaves linear or linear-lanceolate, attenuate, entire or the upper with a pair of slender lobes; bracts and calyces violet-purple to purple-red, the former with 2 or 3 pairs of lobes; calyx in anthesis 10 mm. long, cleft medianly about four-fifths the length and laterally nearly as deeply; corolla 12–14 mm. long, its galea 4 mm. long, purple, with narrow violet-purple thin margins, its lower lip slightly shorter, proximally forming a greenish pouch, distally with violet-purple appressed lobes, 1.5–2 mm. long.

Rocky open ground, Arctic-Alpine Zone; Wallowa Mountains of northeastern Oregon. Type locality: Wallowa Mountains. July–Aug.

8. *Castilleja cinerea* A. Gray. Ashy-grey Indian Paint-brush. Fig. 4852.

Castilleja cinerea A. Gray, Proc. Amer. Acad. 19: 93. 1883.

Plant perennial, densely cinereous-pubescent, the inflorescence hirsute with yellow hairs; stems many, densely clustered, 1–2 dm. tall, simple or little-branched. Leaves numerous and overlapping, linear, entire or the upper with a pair of divaricate lobes; bracts and calyces greenish yellow to dull violet-purple, the bracts broadly rounded and with 1 or 2 pairs of lobes; calyx 15 mm. long, cleft medianly nearly half its length, laterally nearly as deeply into linear or lance-linear lobes; corolla 15–17 mm. long, its galea 4–5 mm. long, yellowish green, and with narrow purplish thin margins, its lower lip 2–2.5 mm. long, green and thickened even to the minute incurved lobes; capsule 5 mm. long.

Stony open places, Arid Transition Zone; San Bernardino Mountains, southern California. Type locality: Bear Valley, San Bernardino Mountains. May–Aug.

9. *Castilleja orésbia* Greenm. Pale Wallowa Indian Paint-brush. Fig. 4853.

Castilleja oresbia Greenm. Bot. Gaz. 48: 147. 1909.

Plant perennial, finely pubescent below the villous inflorescence, the stems clustered, 1.5–2.5 dm. tall, simple or branched. Leaves linear-lanceolate, entire or with a pair of divaricate linear-attenuate lobes; bracts and calyces distally dull yellow; calyx 11–13 mm. long, cleft medianly two-fifths its length, laterally only 1–1.5 mm. into lanceolate-attenuate lobes; corolla 13–14 mm. long, its galea 7–8 mm. long, attenuate, puberulent, with narrow pale thin margins, its lower lip 5–6 mm. long, proximally green and slightly inflated, distally with linear-lanceolate lobes 3–3.5 mm. long; capsule 8 mm. long.

Stony open places, Canadian Zone; Wallowa Mountains, northeastern Oregon. Type locality: Kettle Creek, Oregon. July–Aug.

10. *Castilleja villicaulis* Pennell & Ownbey. Mount Adams Indian Paint-brush. Fig. 4854.

Castilleja villicaulis Pennell & Ownbey, Proc. Acad. Phila. 99: 177. 1947.

Plant perennial, villous-pubescent, especially on stems, these many, 1–2.5 dm. tall, simple or branched. Leaves linear or linear-lanceolate, entire or the upper with a pair of slender lobes; bracts and calyces yellowish, the bracts with 2 pair of lobes; calyx 13 mm. long, cleft medianly nearly half its length, laterally only 0.5–1 mm. into acute to rounded lobes; corolla 13–14 mm. long, its galea 5 mm. long, attenuate, puberulent, with narrow pale thin margins, its lower lip 3–4 mm. long, proximally not inflated, distally with thickened greenish puberulent lobes; capsule 8 mm. long.

Light volcanic soil, Arctic-Alpine Zone; Mount Adams, Washington. Type locality: Mount Adams. July–Aug.

11. *Castilleja cryptantha* Pennell & Jones. Obscure Indian Paint-brush. Fig. 4855.

Castilleja cryptantha Pennell & Jones, Proc. Biol. Soc. Wash. 50: 208. 1937.

Plant perennial, villous-pubescent, the stems few or several in a cluster, 1–1.5 dm. tall, simple. Leaves linear-lanceolate, acuminate, entire or at least the upper with a pair of slender lobes; bracts dark vinaceous-brown, 3-cleft, longer than the flowers; calyx 15 mm. long, greenish yellow, brighter distally, cleft medianly one-third length, laterally only 0.5–1 mm. long, into acute to obtuse lobes; corolla 15 mm. long, wholly included within calyx, its galea 4–5 mm. long, puberulent, with wide pale thin margins, its lower lip 2–3 mm. long, proximally slightly inflated and with 3 green ridges which pass into the pale or white lobes; capsule 6–7 mm. long.

Grassy meadow, Arctic-Alpine Zone; Mount Rainier, Washington. Type locality: Yakima Park, Mount Rainier National Park, Washington. July–Aug.

12. *Castilleja pallescens* (Nutt.) Greenm. Pale Indian Paint-brush. Fig. 4856.

Orthocarpus pallescens A. Gray, Amer. Journ. Sci. II. 34: 339. 1862. Based upon *Euchroma pallescens* Nutt. ined.

Castilleja pallescens Greenm. Bot. Gaz. 25: 266. 1898.

Plant perennial, minutely pubescent, the stems numerous, clustered, 1–2 dm. tall, simple. Leaves filiform-linear, entire or with a pair of slender lobes; bracts and calyces yellowish, the

bracts mostly with 2 pairs of slender lobes; calyx 20 mm. long, cleft medianly one-third length, laterally only 0.5–1 mm. into obtusish lobes; corolla 20 mm. long, its galea 5–7 mm. long, attenuate, puberulent, with narrow pale thin margins, its lower lip 5–6 mm. long, proximally slightly inflated, puberulent and greenish, distally with pale attenuate-tipped lobes; capsule 8 mm. long.

Stony open soil, Arid Transition Zone; mountains of northeastern Oregon and central Idaho. Type locality: "Rocky Mountains," probably actually central Idaho. May–Aug.

13. *Castilleja cervina* Greenm. Deer Indian Paint-brush. Fig. 4857.

Castilleja cervina Greenm. Bot. Gaz. 25: 269. 1898.

Plant perennial, finely pubescent, the stems numerous, clustered, 3–7 dm. tall, simple or little branched. Leaves linear or linear-lanceolate, entire or the middle and upper with a pair of slender lobes; bracts and calyces yellow, the bracts mostly with 2 pairs of lobes; calyx 20 mm. long, cleft medianly about one-half the length, laterally only 0.5–2 mm. into acutish lobes; corolla 20–25 mm. long, its galea 5–8 mm. long, puberulent, with pale thin margin, its lower lip 3–6 mm. long, proximally green and puberulent, with pale appressed lobes; capsule 7–8 mm. long.

Among sagebrush, Arid Transition Zone; Columbia River Valley, southern British Columbia to central Washington. May–June.

14. *Castilleja Thompsonii* Pennell. Thompson's Indian Paint-brush. Fig. 4858.

Castilleja Thompsonii Pennell, Proc. Acad. Phila. 99: 178. 1947.

Plant perennial, hirsute with glandless hairs, the stems many, clustered, 1–3 dm. tall, simple or somewhat branched. Leaves lance-linear, entire or some with 1 or 2 pairs of slender lobes; bracts and calyces distally yellowish, the bracts with 2 pairs of lobes; calyx 15–23 mm. long, cleft medianly 4–5 mm., laterally only 0.5–2 mm. into obtuse to rounded lobes; corolla 18–27 mm. long, its galea 5–7 mm. long, dorsally green and puberulent, ventrally with wide whitish thin margins, its lower lip 3–5 mm. long, proximally pale and slightly inflated, distally with white oblong-rounded appressed lobes; capsule 10 mm. long.

Sandy or rocky sagebrush land, Upper Sonoran and Transition Zones; interior Columbia River Valley, eastern Washington. Type locality: near Coulee City in Grand Coulee, Washington. May–June.

15. *Castilleja Cusickii* Greenm. Cusick's Indian Paint-brush. Fig. 4859.

Castilleja pallida var. *camporum* Greenm. Bot. Gaz. 25: 266. (April) 1898.

Castilleja Cusickii Greenm. op. cit. 267. (April) 1898.

Castilleja lutea Heller, Bull. Torrey Club 25: 268. (May) 1898.

Castilleja camporum Howell, Fl. N.W. Amer. 532. 1901.

Castilleja pannosa Eastw. Leaflets West. Bot. 3: 116. 1942.

Plant perennial, hirsute-pubescent, the stems several or many in a clump, 2–5 dm. tall, simple. Leaves numerous, lanceolate-attenuate, with 1–3 pairs of spreading slender lobes; bracts and calyces yellowish or yellow, the bracts distally rounded and less lobed than the leaves; calyx 22–24 mm. long, cleft medianly one-half its length, laterally about 1 mm. into rounded lobes; corolla 20–22 mm. long, even in anthesis exceeded by calyx, its galea 4 mm. long, dorsally glandular-puberulent, ventrally with narrow pale thin margins, its lower lip 3 mm. long, proximally inflated, ridged and pubescent, distally with whitish ovate lobes; capsule 9–10 mm. long.

Moist granitic meadows, Arid Transition Zone; eastern Washington and northeastern Oregon to Montana and Wyoming. Type locality: Sumter Valley, Blue Mountains, Oregon. May–June.

16. *Castilleja chrysantha* Greenm. Common Wallowa Indian Paint-brush. Fig. 4860.

Castilleja chrysantha Greenm. Bot. Gaz. 48: 146. 1909.

Castilleja indecora Piper, Proc. Biol. Soc. Wash. 31: 76. 1918.

Plant perennial, pubescent below the villose inflorescence, the stems numerous in clump, 1–3 dm. tall, simple. Leaves linear-lanceolate to lanceolate, attenuate, entire or sometimes with a pair of slender rather short lobes; bracts and calyces greenish white to light yellow, at least the upper bracts with a pair of slender lobes; calyx 20 mm. long, cleft medianly nearly one-half its length, laterally only slightly (not over 2 mm.), if at all, into usually rounded lobes; corolla 18–20 mm. long, exceeding calyx in anthesis, its galea 7–8 mm. long, attenuate, dorsally puberulent, with wide pale thin margins, its lower lip 4–5 mm. long, proximally greenish and pubescent, distally with pale ovate lobes; capsule 9 mm. long.

Meadows and lake margins, Hudsonian and Arctic-Alpine Zones; Wallowa and Elkhorn Mountains of northeastern Oregon. Type locality: head of West Eagle Creek, Wallowa Mountains, Oregon. June–Aug.

17. *Castilleja Ownbeyana* Pennell. Ownbey's Indian Paint-brush. Fig. 4861.

Castilleja Ownbeyana Pennell, Proc. Acad. Phila. 99: 179. 1947.

Plant perennial, villose-pubescent, stem villose-hirsute with glandless hairs, the stems densely clustered, 1–1.5 dm. tall. Leaves lanceolate, attenuate, entire or with a pair of lobes; bracts and calyces distally yellowish or purplish, the bracts with a pair of linear-lanceolate lobes; calyx 15–16 mm. long, cleft medianly about one-half its length, laterally only 0.5–1 mm. into rounded lobes; corolla 16–17 mm. long, its galea 6–7 mm. long, puberulent, with wide purple

thin margins, its lower lip 4–5 mm. long, proximally scarcely or not pouched, distally with purple lobes 2 mm. long; capsule 7–8 mm. long.

Alpine meadows, Arctic-Alpine Zone; Wallowa Mountains, northeastern Oregon. Type locality: Wallowa Mountains. July–Aug.

18. *Castilleja Lemmonii* A. Gray. Lemmon's Indian Paint-brush. Fig. 4862.

Castilleja Lemmonii A. Gray, Syn. Fl. N. Amer. 2: 297. 1878.

Castilleja lassenensis Eastw. Leaflets West. Bot. 2: 244. 1940.

Plant perennial, glandular-pubescent below the villose inflorescence, the stems numerous in clump, 1–2 dm. tall, simple. Leaves linear or lance-linear, entire or sometimes the upper with a pair of short lobes; bracts and calyces distally purple, at least the upper bracts rounded and with 1 or 2 pairs of lobes; calyx 16–18 mm. long, cleft medianly two-thirds its length, laterally 1–2 mm. or less into rounded lobes; corolla 20 mm. long, exceeding calyx in anthesis, its galea 8–9 mm. long, dorsally glandular-hairy, ventrally with purple thin margins, its lower lip 6–7 mm. long, glabrous or nearly so, proximally green and somewhat inflated, distally with short pale purplish lobes; capsule 7 mm. long.

Moist meadows, Hudsonian and Arctic-Alpine Zones; Sierra Nevada from Lassen County to Inyo County, California. Type locality: Sierra County, California. July–Sept.

19. *Castilleja Culbertsonii* Greene. Culbertson's Indian Paint-brush. Fig. 4863.

Castilleja Culbertsonii Greene, Leaflets Bot. Obs. 1: 78. 1904.

Plant perennial, glandular-pubescent below the villose inflorescence, the stems solitary or few in a clump, 1–2 dm. tall, simple or somewhat branched. Leaves linear-lanceolate, entire or sometimes the upper with a pair of short lobes; bracts and sepals distally purple, at least the upper rounded and with 1 or 2 pairs of lobes; calyx 16–18 mm. long, cleft medianly about one-half its length, laterally 1–2 mm. or less into rounded lobes; corolla 17–19 mm. long, exceeding calyx in anthesis, its galea 8–10 mm. long, attenuate-tipped, dorsally puberulent or glabrescent, with purple thin margins, its lower lip 4 mm. long, glabrous or nearly so, proximally dark green and thickened, distally with rudimentary very short lobes; capsule 8–9 mm. long.

Wet meadows, Canadian Zone to Arctic-Alpine Zone; southern Sierra Nevada in Fresno and Tulare Counties, California. Type locality: Crabtree Meadow, near Mount Whitney, California. July–Aug.

20. *Castilleja levisecta* Greenm. Golden Indian Paint-brush. Fig. 4864.

Castilleja levisecta Greenm. Bot. Gaz. 25: 268. 1898.

Plant perennial, hirsute-pubescent, the stems many in a clump, 2–5 dm. tall, simple or slightly branched. Leaves oblong-lanceolate, distally with 2 or 3 pairs of short lobes; bracts and calyces distally yellow or orange-yellow; calyx 15–17 mm. long, cleft medianly one-third its length, laterally 1–2 mm. into rounded lobes; corolla 21–23 mm. long, shorter than bracts in anthesis, its galea 8 mm. long, blunt, dorsally distally puberulent, ventrally with wide pale thin margins, its lower lip 2 mm. long, green, rudimentary; capsule 8–10 mm. long.

Meadows and along water, Humid Transition Zone; Pacific lowland from Vancouver Island to Linn County, Oregon. Type locality: Mill Plain (Fort Vancouver), Washington. April–May.

21. *Castilleja brevilobata* Piper. Short-lobed Red Indian Paint-brush. Fig. 4865.

Castilleja brevilobata Piper, Proc. Biol. Soc. Wash. 33: 104. 1920.

Plant perennial, finely glandular-pubescent, the stems many in a clump, 1–2 dm. tall, simple or somewhat branched. Leaves oblong-lanceolate, distally with 1 or 2 pairs of short lobes (or the lower entire); bracts and calyces distally scarlet-red; calyx 12–14 mm. long, cleft medianly about one-third its length, laterally 1–2 mm. into rounded lobes; corolla 15–16 mm. long, exceeding bracts in anthesis, its galea 6 mm. long, blunt, dorsally puberulent distally, ventrally with wide red thin margins, its lower lip 2 mm. long, green, rudimentary.

Reddish soil, Humid Transition Zone; Klamath Mountains of Josephine County, southwestern Oregon. Type locality: 8 miles south of Waldo, Oregon. May–June.

22. *Castilleja Elmeri* Fernald. Elmer's Indian Paint-brush. Fig. 4866.

Castilleja Elmeri Fernald, Erythea 6: 51. 1898.

Plant perennial, finely glandular-pubescent, more so in the inflorescence, the stems (in only specimen seen) from a somewhat decumbent base, 1.5–2 dm. tall, simple. Leaves linear-lanceolate, entire; bracts and calyx distally purple, the upper bracts broadly rounded and with a pair of short lobes; calyx 16 mm. long, cleft medianly about one-half its length, laterally 1.5 mm. into ovate acute or obtuse lobes; corolla 20 mm. long, exceeding bracts in anthesis, its galea 7 mm. long, dorsally puberulent, with narrow thin margins, its lower lip 2 mm. long, green, pro-tuberant, rudimentary.

Probably Canadian Zone; Wenatchee Mountains, central Washington. Type locality: Wenatchee Mountains. June–July.

23. *Castilleja chlorotica* Piper. Wide-flowered Indian Paint-brush. Fig. 4867.

Castilleja chlorotica Piper, Proc. Biol. Soc. Wash. 33: 104. 1920.

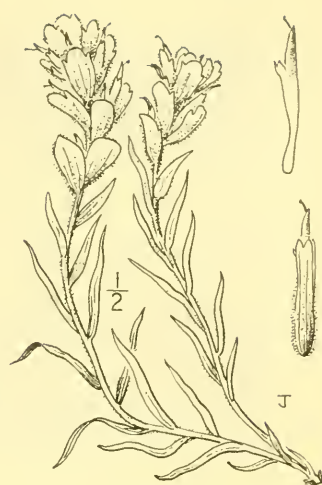
Plant perennial, finely glandular-pubescent throughout, the stems many in clump, 1.5–2 dm.



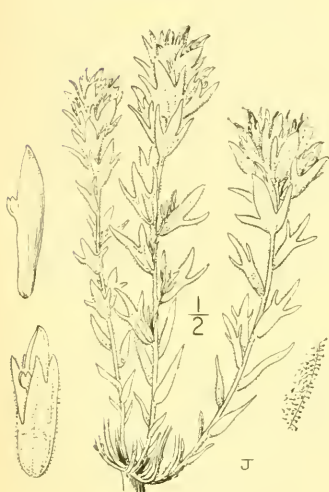
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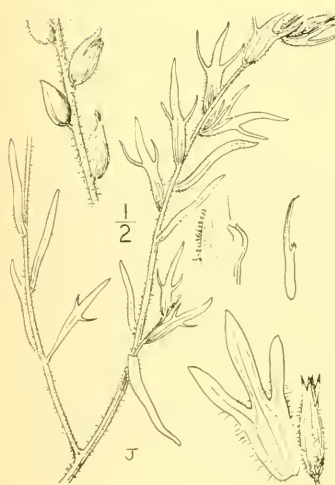
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4864. *Castilleja levisecta*
 4865. *Castilleja brevlobata*
 4866. *Castilleja Elmeri*

4867. *Castilleja chlorotica*
 4868. *Castilleja xanthotricha*
 4869. *Castilleja glandulifera*

4870. *Castilleja Wherryana*
 4871. *Castilleja Breweri*
 4872. *Castilleja lutescens*

tall, simple. Leaves lanceolate, entire or the upper with a pair of lobes; bracts and calyx distally yellowish, the bracts strongly trilobed; calyx 15–17 mm. long, cleft medianly nearly one-half its length, laterally 2–4 mm. into acute or acutish lobes; corolla 16–18 mm. long, slightly exceeding calyx, its galea 9 mm. long, acute, dorsally puberulent, with wide purple thin margins, its lower lip 2–3 mm. long, green, thickened, rudimentary.

Canadian Zone; Gearhart Butte, southern Oregon. Type locality: Gearhart ("Grayhart") Butte, Oregon. June–Aug.

24. *Castilleja xanthotricha* Pennell. Yellow-haired Indian Paint-brush. Fig. 4868.

Castilleja xanthotricha Pennell, *Notulae Naturae* No. 74: 5. 1941.

Plant perennial, hirsute with spreading glandless hairs, but the foliage also with short gland-tipped ones, the stems many in clump, 1–2 dm. tall, simple. Leaves linear-lanceolate, entire or most with a pair of slender lobes; bracts and calyces yellowish or dull reddish yellow (not seen fresh); calyx 17–18 mm. long, cleft medianly one-half its length, laterally 2–3 mm. into rounded lobes; corolla 18–21 mm. long, in anthesis exceeding calyx, its galea 7–9 mm. long, obtuse, dorsally puberulent, with pale thin margins, its lower lip 2–3 mm. long, greenish, rudimentary.

Sandy soil, presumably among sagebrush, Upper Sonoran and Transition Zones; Columbia and Snake River Valleys, at least from Wasco County to Baker County, northern Oregon. Type locality: Clarno, Wasco County, Oregon. June.

25. *Castilleja glandulifera* Pennell. Sticky Indian Paint-brush. Fig. 4869.

Castilleja glandulifera Pennell, *Notulae Naturae* No. 74: 8. 1941.

Plant perennial, glandular-pubescent, the stems many, 1–4 dm. tall, simple or slightly branched. Leaves linear or linear-lanceolate, entire or usually with a pair of slender lobes; bracts and calyces distally yellow, the bracts deeply lobed; calyx 14–15 mm. long, cleft medianly one-fourth to one-half its length, laterally 4–5 mm. into lanceolate acute lobes; corolla 15–25 mm. long, exceeding calyx in anthesis, its galea 7–10 mm. long, attenuate, dorsally puberulent, with narrow yellowish or purplish thin margins, its lower lip 1–2 mm. long, dark green, thickened, rudimentary; capsule 11–12 mm. long.

Sandy granitic soil, Canadian and Hudsonian Zones; Blue, Wallowa, and Steen Mountains, eastern Oregon. Type locality: Anthony Peak, Elkhorn Mountains, Baker County, Oregon. June–Aug.

Castilleja glandulifera subsp. *pallida* (Eastw.) Pennell. (*Castilleja Breweri* var. *pallida* Eastw. *Leaflets West. Bot.* 2: 284. 1940.) Hairs of stem mostly glandless, and usually so long and dense that stem is hirsute. Sandy granitic soil, Canadian or Hudsonian Zone; occasional in Siskiyou Mountains and Sierra Nevada, Jackson County, Oregon, to Alpine County, California. Type locality: Carson Pass, Alpine County, California. May–July. (Inadequately known, and perhaps wrongly associated.)

26. *Castilleja Wherryana* Pennell. Wherry's Indian Paint-brush. Fig. 4870.

Castilleja Wherryana Pennell, *Proc. Acad. Phila.* 99: 180. 1947.

Plant perennial, closely glandular-pubescent, and pilose with interspersed glandless hairs; the stems clustered, 3–6 dm. tall, simple or branched. Leaves lanceolate, entire or distally with a pair of spreading lobes; bracts and calyces distally scarlet; calyx 15–17 mm. long, cleft medianly 4–5 mm., laterally 1.5–2 mm. into lanceolate lobes; corolla 13–15 mm. long, its galea 8–10 mm. long, dorsally glandular-puberulent and with longer median glandless hairs, the thin margins reddish, its lower lip 1.5 mm. long, dark green, with the rudimentary lobes incurved; capsule 13–14 mm. long.

Sandy or gravelly soil, sagebrush or open pineland, Arid Transition Zone; Crook County to Baker County, eastern Oregon. Type locality: Dooley Mountain, south of Salisbury, Baker County, Oregon. June.

27. *Castilleja Breweri* Fernald. Brewer's Indian Paint-brush. Fig. 4871.

Castilleja Breweri Fernald, *Erythea* 6: 49. 1898.

Castilleja Peirsonii Eastw. *Leaflets West. Bot.* 1: 175. 1935.

Castilleja adenophora Eastw. *op. cit.* 3: 87. 1941.

Plant perennial, finely to strongly glandular-pubescent and usually with longer interspersed glandless hairs, the stems many, 1–2 dm. tall, simple or slightly branched. Leaves linear-lanceolate, entire or the upper with a pair of slender lobes; bracts and calyces distally scarlet or scarlet-red, the bracts strongly 3-lobed; calyx 13–15 mm. long, cleft medianly over one-third its length, laterally 3–4 mm. into lanceolate acutish lobes; corolla 16–22 mm. long, exceeding calyx in anthesis, its galea 7–10 mm. long, attenuate, puberulent or minutely pubescent dorsally, with wide red thin margins, its lower lip 2–3 mm. long, dark green, thickened, rudimentary; capsule 9–11 mm. long.

Meadows and ash slopes, Hudsonian and Arctic-Alpine Zones; Sierra Nevada from Eldorado County to Inyo County, California. Type locality: Mount Dana, California. June–Aug.

28. *Castilleja lutescens* (Greenm.) Rydb. Stiff Yellowish Indian Paint-brush. Fig. 4872.

Castilleja pallida var. *lutescens* Greenm. *Bot. Gaz.* 25: 265. 1898.

Castilleja lutescens Rydb. *Mem. N.Y. Bot. Gard.* 1: 359. 1900.

Plant perennial, scabro-pubescent with glandless hairs below the yellow-hirsute inflorescence, the stems many, 3–5 dm. tall, simple or branched. Leaves linear-lanceolate to lanceolate, entire

or the upper distally with a pair of short lobes; bracts and calyces distally pale or dull yellow, the bracts with 1 or 2 pairs of lobes; calyx 16–18 mm. long, cleft medianly nearly one-half its length, laterally 1–2 mm. into ovate acutish to rounded lobes; corolla 16–17 mm. long, slightly exceeding calyx and bract in anthesis, its galea 7 mm. long, attenuate, puberulent dorsally, with wide pale thin margins, its lower lip 2 mm. long, dark green, rudimentary; capsule 10–11 mm. long.

Grassland and open coniferous forest, Arid Transition Zone; southern British Columbia to northeastern Oregon and Montana. Type locality: Spokane County, Washington. May–July.

29. *Castilleja septentrionalis* Lindl. Labrador Indian Paint-brush. Fig. 4873.

Castilleja septentrionalis Lindl. Bot. Reg. 11: pl. 925. 1825.

Castilleja pallida var. *septentrionalis* A. Gray, Bot. Calif. 1: 575. 1876.

Plant perennial, finely pubescent to glabrous below the villose inflorescence, the stems several to many, 1.5–3 dm. tall, simple. Leaves linear-lanceolate to lanceolate, entire or the upper occasionally with a pair of short lobes; bracts and calyces distally yellowish, the lower bracts entire but the upper with a pair of shallow lobes; calyx 12 mm. long, cleft medianly about one-half its length, laterally 1–3 mm. into lance-ovate acute or acutish lobes; corolla 14–18 mm. long, exceeding calyx and bract in anthesis, its galea 6–7 mm. long, attenuate, puberulent dorsally, with wide pale thin margins, its lower lip 2 mm. long, dark green, thickened, rudimentary; capsule 9–10 mm. long.

Rocky mountain slopes, Arctic-Alpine Zone; southern British Columbia and northern Washington (Mount Stuart), east across continent to Labrador and Maine, south in Rocky Mountains to New Mexico. Type locality: Labrador. July–Aug.

30. *Castilleja rústica* Piper. Rustic Indian Paint-brush. Fig. 4874.

Castilleja rustica Piper, Bull. Torrey Club. 27: 398. 1900.

Plant perennial, finely pubescent below the villulose to villose inflorescence, the stems many, 1.5–2 dm. tall, simple or branched. Leaves linear-lanceolate, entire or with a pair of lobes; bracts and calyces distally yellow, the bracts with a pair of divaricate slender lobes; calyx 10–13 mm. long, cleft medianly over one-third its length, laterally 1–2 mm. into ovate acute or acutish lobes; corolla 18 mm. long, exceeding calyx and bract in anthesis, its galea 7 mm. long, acutish, puberulent dorsally, with narrow reddish thin margins, its lower lip 3 mm. long, dark green, thickened, rudimentary; capsule 10 mm. long.

Stony mountain slopes, Canadian Zone; Wallowa Mountains of northeastern Oregon. Type locality: Wallowa River, Oregon. June–Aug.

31. *Castilleja taedífera* Pennell. Torch-like Indian Paint-brush. Fig. 4875.

Castilleja taedifera Pennell, Notulae Naturae No. 74: 6. 1941.

Plant perennial, pubescent or hirsute-pubescent below the villose inflorescence, the stems clustered, 1.5–2 dm. tall, simple or branched. Leaves lanceolate, entire or the upper distally with a pair of lobes; bracts and calyces distally scarlet, the bracts with a pair of slender lobes; calyx 15 mm. long, cleft medianly one-third its length, laterally 2 mm. into obtuse or acutish lobes; corolla 12–15 mm. long, its galea 5–7 mm. long, glandular-pubescent dorsally, with orange-yellow thin margins, its lower lip 2 mm. long, dark green, with rudimentary paler green lobes.

Dry stony slopes, Wallowa County, northeastern Oregon. Type locality: Buckhorn Springs, Oregon. June–July.

32. *Castilleja wallowénsis* Pennell. Wallowa Purple Indian Paint-brush. Fig. 4876.

Castilleja wallowensis Pennell, Notulae Naturae No. 74: 7. 1941.

Plant perennial, finely pubescent below the villose inflorescence, the stems clustered, 1.5 dm. tall, simple. Leaves lanceolate, attenuate, entire; bracts and calyces dull purple, the upper bracts with a pair of slender lobes; calyx in anthesis 12–13 mm. long, cleft medianly one-third its length, laterally 1.5 mm. into oblong rounded lobes; corolla 15–18 mm. long, its galea 5–7 mm. long, glandular-pubescent to glabrescent dorsally, with purple thin margins, its lower lip 2–3 mm. long, dark green with thin white free lobes.

Moist granitic soil, Arctic-Alpine Zone; Wallowa Mountains of northeastern Oregon. Type locality: mountain south of Ice Lake, Wallowa County, Oregon. July–Aug.

33. *Castilleja fráterna* Greenm. Fraternal Indian Paint-brush. Fig. 4877.

Castilleja fraterna Greenm. Bot. Gaz. 48: 147. 1909.

Plant perennial, finely pubescent below the villose-hirsute inflorescence, the stems many, 1–2 dm. tall, simple or somewhat branched. Leaves linear- to oblong-lanceolate, entire or the upper distally with a pair of short lobes; bracts and calyces distally red, the former usually with a pair of lobes; calyx 20–25 mm. long, cleft medianly nearly one-half its length, laterally 0.5–3 mm. into rounded lobes; corolla 23–33 mm. long, exceeding calyx in anthesis, its galea 7–11 mm. long, acute, puberulent dorsally, with wide red thin margins, its lower lip 2–4 mm. long, green, thickened, rudimentary; capsule 10 mm. long.

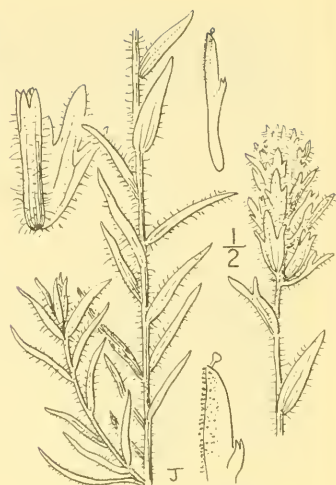
Willow thickets, Arctic-Alpine Zone; Wallowa Mountains, northeastern Oregon. Type locality: Wallowa Mountains, Oregon. July–Aug.



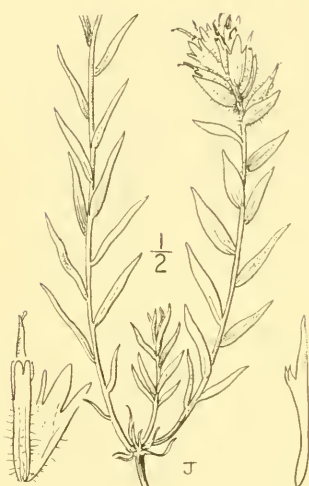
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4873. *Castilleja septentrionalis*
 4874. *Castilleja rustica*
 4875. *Castilleja taedifera*

4876. *Castilleja wallowensis*
 4877. *Castilleja fraterna*
 4878. *Castilleja Suksdorfii*

4879. *Castilleja mendocinensis*
 4880. *Castilleja latifolia*
 4881. *Castilleja littoralis*

34. *Castilleja Suksdórfii* A. Gray. Suksdorf's Indian Paint-brush. Fig. 4878.

Castilleja Suksdórfii A. Gray, Proc. Amer. Acad. 22: 311. 1887.

Plant perennial, pilose to glabrescent below the villose inflorescence, the stems solitary or few, mostly arising at apices of slender branched rhizomes, 4-7 dm. tall, simple or slightly branched. Leaves lanceolate, entire or the upper with a pair of slender lobes; bracts and calyces distally scarlet, this sharply demarcated by yellow band from green proximal portion, the bracts with 1 to 3 pairs of lobes, the segments all attenuate to sharp tips; calyx 25-30 mm. long, cleft medianly one-half to two-thirds its length, laterally 7-10 mm. into linear-attenuate lobes; corolla 30-40 mm. long, exceeding calyx and bract in anthesis, its galea 20-25 mm. long, attenuate, pubescent dorsally, with wide reddish thin margins, its lower lip 2 mm. long, dark green, protuberant-upcurved, rudimentary; capsule 12-13 mm. long.

Meadows and thickets, Canadian Zone; Cascade Mountains, from Mount Adams, Washington, to the Three Sisters, Oregon. Type locality: Mount Adams, Washington. June-Sept.

35. *Castilleja mendocinensis* (Eastw.) Pennell. Mendocino Coast Indian Paint-brush. Fig. 4879.

Castilleja latifolia var. *mendocinensis* Eastw. Leaflets West. Bot. 1: 238. 1930.

Plant perennial, softly pubescent below the villose-hirsute inflorescence, the stems diffusely decumbent from extensively spreading rhizomes, proximally slightly woody, then erect and herbaceous, much branched, 4-6 dm. long. Leaves oblong to orbicular, entire or the upper with a pair of short lobes, all segments broadly rounded; bracts and calyces distally scarlet or scarlet-red, the former with a pair of lobes, the latter with distal color sharply differentiated against the yellow summit of the green proximal portion; calyx 20-22 mm. long, cleft medianly one-half its length, laterally 2-5 mm. into oblong or ovate acute to rounded lobes; corolla 29-32 mm. long, exceeding calyx and bract in anthesis, its galea 17-18 mm. long, attenuate to the blunt apex, strongly pubescent dorsally, with narrow yellow thin margins, its lower lip 3 mm. long, dark green, protuberant, rudimentary; capsule 18 mm. long.

Sandy ocean bluffs, Humid Transition Zone; shore of Humboldt and Mendocino Counties, California. Type locality: Mendocino City, California. May-Aug.

36. *Castilleja latifolia* Hook. & Arn. Monterey Coast Indian Paint-brush. Fig. 4880.

Castilleja latifolia Hook. & Arn. Bot. Beechey 154. 1830.

Castilleja macrocarpa Benth. Scroph. Indicae 13. 1835.

Castilleja latifolia var. *carmelensis* Eastw. Leaflets West. Bot. 1: 237. 1936.

Plant perennial, rough-pubescent below the villose-hirsute inflorescence, the stems diffusely ascending or erect, shrubby below, much-branched and herbaceous above, altogether 3-5 dm. long. Leaves oblong, often widely so, entire, truncately rounded; bracts and calyces distally scarlet-red to scarlet, the former entire, the latter with distal color sharply demarcated against the yellow summit of the yellowish green proximal portion; calyx 18-22 mm. long, cleft medianly about one-half its length, laterally less than 2 mm. into rounded lobes or else these essentially with a common rounded apex; corolla 24-27 mm. long, slightly exceeding bract in anthesis, its galea 15-20 mm. long, attenuate to the acutish or obtuse apex, pubescent dorsally, with wide reddish thin margins, its lower lip 2 mm. long, dark green, appressed, rudimentary; capsule 12-15 mm. long.

Sand dunes and sandy bluffs, Humid Transition Zone; shore of Santa Cruz and Monterey Counties, California. Type locality: Monterey Bay, California. Feb.-Sept.

37. *Castilleja litoralis* Pennell. Oregon Coast Indian Paint-brush. Fig. 4881.

Castilleja litoralis Pennell, Proc. Acad. Phila. 99: 183. 1947.

Plant perennial, scabro-pilose to glabrescent below the hirsute inflorescence (or somewhat hirsute on lower part of stem), the stems nearly or wholly herbaceous, branched, ascending or erect, 3-9 dm. long. Leaves linear- to ovate-oblong, rounded, entire; bracts and calyces distally scarlet or scarlet-red, the upper bracts with a pair of linear-lanceolate lobes; calyx 20-25 mm. long, cleft medianly one-third to two-fifths its length, laterally 1-4 mm. into ovate-rounded lobes; corolla 25-30 mm. long, its galea 13 mm. long, villose-pilose dorsally, with wide red thin margins, its lower lip 2 mm. long, dark green to dark violet, protuberant with rudimentary lobes; capsule 13 mm. long.

Sandy bluffs along ocean, Humid Transition Zone; rocky coast from Grays Harbor County, Washington, to Humboldt County, California. Type locality: Bandon, Coos County, Oregon. April-Sept.

38. *Castilleja inflata* Pennell. Marin Coast Indian Paint-brush. Fig. 4882.

Castilleja inflata Pennell, Proc. Acad. Phila. 99: 184. 1947.

Plant perennial, pubescent or somewhat hirsute-pilose below the villose-hirsute inflorescence, the stems nearly or wholly herbaceous, much-branched, decumbent and ascending, 3-4 dm. long. Leaves usually oblong, entire or with 1 or 2 pairs of narrow lobes, all rounded; bracts and calyces distally scarlet, the latter with tube pale yellow and somewhat inflated; calyx 21-23 mm. long, cleft medianly nearly one-third its length, laterally scarcely less deeply into oblong rounded lobes (the uppermost calyx-lobe sometimes present, lanceolate-subulate, 3 mm. long);

corolla 25 mm. long, its galea 13–14 mm. long, strongly pubescent dorsally, with wide reddish thin margins, its lower lip 1–2 mm. long, protuberant, green, rudimentary; capsule 14 mm. long.

Sandy granitic bluffs, Humid Transition Zone; shore of Marin County, California. Type locality: Point Reyes, California. May–Aug.

39. *Castilleja Wightii* Elmer. Wight's Indian Paint-brush. Fig. 4883.

Castilleja Wightii Elmer, Bot. Gaz. 41: 322. 1906.

Castilleja latifolia var. *Wightii* Zeile in Jepson, Man. Fl. Pl. Calif. 937. 1925.

Castilleja latifolia var. *pinnatifida* Eastw. Leaflets West. Bot. 1: 237. 1936.

Castilleja inornata Eastw. op. cit. 3: 90. 1941.

Castilleja uliginosa Eastw. op. cit. 117.

Plant perennial, the foliage pilose or pubescent with glandular and interspersed gland-tipped hairs, the stem more densely pubescent and becoming villous in the inflorescence. Stems decumbent or erect, much-branched, shrubby below and herbaceous above, altogether 4–8 dm. long; leaves narrowly to widely oblong, entire or the upper sometimes with a pair of lobes, the segments all rounded or obtuse, the main leaves usually subtended by leafy fascicles; bracts and calyces distally yellowish or reddish, the former with a pair of rounded lobes; calyx 18–20 mm. long, cleft medianly one-third to one-half its length, laterally 2–3 mm. into ovate abruptly acuminate to obtuse or rounded lobes; corolla 21–25 mm. long, its galea 13–15 mm. long, stout, blunt or bluntish, pubescent dorsally, with wide pale thin margins, its lower lip 2 mm. long, thickened and dark green, protuberant, placed below ventral slit of calyx; capsule 8–11 mm. long.

Ravines and banks, openings in coastal coniferous forest, Humid Transition Zone; around San Francisco Bay, California. Type locality: between Spring Valley Lake and San Pedro, San Mateo County, California. March–July.

Castilleja Wightii subsp. *rùbra* Pennell, Proc. Acad. Phila. 99: 183. 1947. (*Castilleja episcopalis* Pennell, Proc. Acad. Phila. 99: 182. 1947.) Bracts and calyces distally bright red, the latter with lobes usually more rounded; corolla rather larger, usually 23–28 mm. long, the inflorescence less crowded and more slender. Thickets, near the coast, Mendocino County to San Francisco and Alameda Counties, California. Type locality: west of Fairfax, Marin County, California. March–July.

Castilleja Wightii subsp. *anacapensis* (Dunkle) Pennell. (*Castilleja anacapensis* Dunkle, Bull. S. Calif. Acad. 41: 135. 1943.) Plant lower, 1–2.5 dm. tall, more diffuse and more glandular, its inflorescence glandular-pubescent to villous; bracts and calyces red. Bushy thickets, Upper Sonoran Zone, Anacapa Island, Channel Islands, southern California. Type locality: middle island of Anacapa Island, Ventura County, California. Aug.

40. *Castilleja mollis* Pennell. Soft-leaved Indian Paint-brush. Fig. 4884.

Castilleja mollis Pennell, Proc. Acad. Phila. 99: 185. 1947.

Plant shrubby, the foliage covered by a soft tomentum of branched and mostly glandless hairs, the stem villous-hirsute (especially in inflorescence) with spreading glandless and partially gland-tipped hairs. Stems diffusely much-branched, at least 3 dm. tall, with short axillary leafy shoots; leaves oblong, entire, distally rounded; bracts pale green or yellowish, obovoid, distally rounded or 3-toothed; calyx 16–17 mm. long, cleft medianly more than two-fifths its length, laterally 2 mm. into ovate acute lobes; corolla 17–18 mm. long, its galea 7–8 mm. long, truncate, strongly pubescent dorsally, with wide pale thin margins, its lower lip 2 mm. long, appressed, green, rudimentary.

Sandy soil, Upper Sonoran Zone; Santa Rosa Island, Channel Islands, southern California. Type locality: Santa Rosa Island, Santa Barbara County, California. Aug.

41. *Castilleja affinis* Hook. & Arn. Lay-and-Collie's Indian Paint-brush. Fig. 4885.

Castilleja affinis Hook. & Arn. Bot. Beechey 154. 1833.

Plant perennial, rough-pubescent below the villous-hirsute inflorescence, the stems erect or ascending, somewhat shrubby below, branched, herbaceous above, altogether 4–6 dm. tall. Leaves narrowly lanceolate or narrowly oblong, entire or with 1 or 2 pairs of slender lobes, the segments obtuse, the main leaves usually subtended by leafy fascicles; bracts and calyces distally red, the former with 1 or 2 pairs of slender lobes; calyx 20–35 mm. long, cleft medianly one-half its length, laterally 4–10 mm. into linear or oblong obtuse lobes; corolla 25–40 mm. long, its galea 15–20 mm. long, attenuate to blunt or bluntish apex, pubescent dorsally, with wide yellowish or reddish thin margins, its lower lip 2–4 mm. long, thickened and dark green, rudimentary; capsule 10 mm. long.

Sandy or rocky chaparral or thickets, Upper Sonoran and Transition Zones; throughout California from Del Norte and Shasta Counties to San Diego County. Type locality: presumably San Francisco, California. Jan.–June.

42. *Castilleja gyrolòba* Pennell. Round-lobed Indian Paint-brush. Fig. 4886.

Castilleja gyrolòba Pennell, Proc. Acad. Phila. 99: 186. 1947.

Plant perennial, pubescent with spreading glandless and with shorter gland-tipped hairs, the inflorescence slightly more villous-hirsute. Stems several or many, simple or branched, erect or ascending, 3–6 dm. tall; leaves lanceolate or oblong-lanceolate, entire or with a pair of lobes, plane or distally somewhat undulate; bracts and calyces distally scarlet or scarlet-red, the former with a pair of spreading lobes, the segments all rounded; calyx 15–25 mm. long, cleft medianly nearly one-half its length, laterally 2–3 mm. into rounded lobes; corolla usually 25–35 mm. long, its galea 15–24 mm. long, puberulent or minutely pubescent dorsally, with

reddish thin margins, its lower lip 1.5–2 mm. long, dark green, protuberant-incurved, rudimentary; capsule 12–13 mm. long.

Chaparral, open oak woodland, ravines, etc., Upper Sonoran Zone; Inner Coast Ranges, from Lake and Yolo Counties to San Diego County, California. Type locality: Oak Flat Camp, north of Los Angeles, California. March–Aug.

43. *Castilleja Martinii* Abrams. Martin's Indian Paint-brush. Fig. 4887.

Castilleja Martinii Abrams, Bull. S. Calif. Acad. 1: 69. 1902.

Plant perennial, pubescent with glandless and with obscure interspersed gland-tipped hairs, the stems and inflorescences villose-hirsute. Stems much-branched, suffrutescent below, altogether 4–8 dm. tall; leaves lanceolate or widely lanceolate, wavy-margined, entire or the upper sometimes with a pair of lobes; bracts and calyces distally scarlet or scarlet-red, the former with a pair of lobes; calyx 13–15 mm. long, cleft medianly about one-third its length, laterally 0.5–2 mm. into ovate lobes; corolla 20–30 mm. long, its galea 12–15 mm. long, attenuate, puberulent or finely pubescent dorsally, with narrow red thin margins, its lower lip 1–2 mm. long, dark green, rudimentary, appressed; capsule 10–12 mm. long.

Sandy soil, Upper Sonoran Zone; mountains of southern California, from the San Gabriel Mountains to the Cuyamaca Mountains. Type locality: Wilson's Peak, Los Angeles County, California. May–June.

44. *Castilleja Ewanii* Eastw. Ewan's Indian Paint-brush. Fig. 4888.

Castilleja Ewanii Eastw. Leaflets West. Bot. 3: 89. 1941.

Plant perennial, pubescent with spreading glandless and with evident interspersed gland-tipped hairs, the inflorescence somewhat villose-hirsute. Stems much-branched below or throughout, suffrutescent near base, altogether 3–5 dm. tall; leaves linear-lanceolate, wavy-margined, entire or the upper sometimes with a pair of lobes; bracts and calyces distally red or scarlet-red, at least the upper bracts with a pair of slender lobes; calyx 16–17 mm. long, cleft medianly one-fourth to one-third its length, laterally 0.5–2 mm. into ovate lobes; corolla 23–26 mm. long, its galea 16–17 mm. long, attenuate, finely pubescent dorsally, with narrow reddish thin margins, its lower lip 1–2 mm. long, dark green, rudimentary, appressed; capsule 12 mm. long.

Sandy or stony granitic soil, often among piñons, Arid Transition Zone; San Bernardino Mountains, southern California. Type locality: Baldwin Lake, San Bernardino Mountains. June.

45. *Castilleja Applegatei* Fernald. Wavy-leaved Indian Paint-brush. Fig. 4889.

Castilleja angustifolia var. *adenophora* Fernald, Erythea 6: 48. 1898.

Castilleja Applegatei Fernald, op. cit. 49.

Castilleja pinetorum Fernald, op. cit. 50.

Castilleja Brooksii Eastw. Proc. Calif. Acad. III. 2: 288. 1902.

[?] *Castilleja trisecta* Greene, Leaflets Bot. Obs. 1: 78. 1904.

Castilleja pinetorum var. *fragilis* Zeile in Jepson, Man. Fl. Pl. Calif. 938. 1925.

Castilleja Roseana Eastw. Leaflets West. Bot. 2: 104. 1938.

Castilleja excelsa Eastw. op. cit. 241. 1940.

Castilleja dolichostylis Eastw. op. cit. 3: 88. 1941.

Castilleja Hoffmannii Eastw. op. cit. 116. 1942.

Plant perennial, glandular-pubescent, the inflorescence also villose-hirsute with longer glandless hairs. Stems clustered, simple to much-branched, somewhat shrubby below, altogether 2–6 dm. tall; leaves linear-lanceolate to lanceolate, wavy-margined, entire or some with a pair of short or slender lobes, the segments all acute or acutish; bracts and calyces distally scarlet, varying to orange and occasionally yellowish, at least the upper bracts with 1 or 2 pairs of slender lobes; calyx 12–22 mm. long, cleft medianly about one-half its length, laterally 2–4 mm. into lanceolate to oblong acute or acutish lobes; corolla 20–30 mm. long, its galea 12–15 mm. long, attenuate, glandular-puberulent dorsally, with wide red thin margins, its lower lip 2 mm. long, thickened, green, rudimentary; capsule 10 mm. long.

Sandy or gravelly soil, often on talus, in sagebrush, juniper or open pine forest, Transition Zone to Hudsonian Zone; Coos and Deschutes Counties, central Oregon, to the mountains of Ventura and Inyo Counties, south-central California and eastward to central Idaho and northwestern Nevada. Type locality: Mount Scott, Klamath County, Oregon. April–Sept.

46. *Castilleja disticha* Eastw. Eastwood's Indian Paint-brush. Fig. 4890.

Castilleja disticha Eastw. Proc. Calif. Acad. III. 2: 289. 1902.

Plant perennial, pubescent with glandless and with shorter interspersed gland-tipped hairs, the inflorescence somewhat villose-pubescent. Stems several or many, slightly to much-branched, sometimes frutescent near base, 3–8 dm. tall; leaves linear-lanceolate to lanceolate, plane to somewhat wavy-margined, entire or the upper sometimes with a pair of short lobes; bracts and calyces distally vermilion-red, the conspicuous galea of the corolla being nearly or quite orange; calyx 12–19 mm. long, cleft medianly about two-fifths its length, laterally 2–3 mm. into lance-attenuate lobes; corolla 27–33 mm. long, its galea 15–21 mm. long, narrowing to a blunt apex, sparsely glandular-puberulent dorsally, with wide red thin margins, its lower lip 2–3 mm. long, dark green, rudimentary; capsule 10 mm. long.

Open coniferous forest, Canadian Zone; southern Sierra Nevada, from Tuolumne County to Fresno County, California. Type locality: Converse Basin, near South Fork of Kings River, California. May–Aug.



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4882. *Castilleja inflata*
 4883. *Castilleja wightii*
 4884. *Castilleja mollis*

4885. *Castilleja affinis*
 4886. *Castilleja gyroloba*
 4887. *Castilleja martinii*

4888. *Castilleja ewanii*
 4889. *Castilleja applegatei*
 4890. *Castilleja disticha*

47. *Castilleja oblongifolia* A. Gray. Oblong-leaved Indian Paint-brush.

Fig. 4891.

Castilleja oblongifolia A. Gray, Syn. Fl. N. Amer. 2: 296. 1878.

Plant presumably perennial, pubescent, the stem and inflorescence hirsute, the stems ascending, lax, more than 5 dm. long. Leaves oblong, acute, entire; bracts and calyces presumably distally red, the former oblong-ovate and acuminate; calyx 30–32 mm. long, cleft medianly about half its length, laterally 8–9 mm. into lance-attenuate lobes; corolla 40–45 mm. long, its galea 20–25 mm. long, attenuate, finely pubescent dorsally, its lower lip 2 mm. long, somewhat protuberant, rudimentary.

Known only from original collection on Cuyamaca Peak of southern San Diego County, California.

48. *Castilleja miniata* Dougl. Great Red Indian Paint-brush. Fig. 4892.*Castilleja miniata* Dougl. ex Hook. Fl. Bor. Amer. 2: 106. 1838.*Castilleja pallida* var. *miniata* A. Gray, Amer. Journ. Sci. 84: 335. 1862.*Castilleja montana* Congdon, Erythea 7: 188. 1900.*Castilleja crispula* Piper, Contr. U.S. Nat. Herb. 11: 516. 1906.*Castilleja miniata* var. *crispula* Nels. & Macbr. Bot. Gaz. 61: 45. 1916.

Plant perennial, glabrous or sometimes pubescent, the inflorescence villous-pubescent, the stems clustered, several or many, herbaceous throughout, erect, simple or somewhat branched above, 4–8 dm. tall. Leaves narrowly to widely lanceolate, acute, entire or the upper occasionally with a pair of short lobes; bracts and calyces distally usually scarlet-red or -vermillion, but varying in hue from red to occasionally flame-scarlet and sometimes duller or paler or both; most or at least the upper bracts with a pair of slender lobes; calyx 17–25 mm. long, cleft medianly one-half to two-thirds its length, laterally 3–7 mm. into lance-attenuate lobes; corolla 20–35 mm. long, its galea 10–20 mm. long, attenuate to a blunt apex, finely pubescent (distally with gland-tipped hairs) dorsally, with red thin margins, its lower lip 1–2 mm. long, dark green, protuberant-incurved; capsule 10–12 mm. long.

Sandy or loam soil, meadows, thickets, or openings in coniferous forest, Transition Zone to Hudsonian Zone; British Columbia to southern California, east to Alberta, Montana, and Colorado. Type locality: Blue Mountains. May–Sept.

49. *Castilleja elata* Piper. Slender Indian Paint-brush. Fig. 4893.*Castilleja elata* Piper, Smiths. Misc. Coll. 50: 201. 1907.

Plant perennial, glabrous below the glandular-pubescent to -hirsute inflorescence. Stems solitary or few, erect, slender, herbaceous throughout, simple or little-branched, 4–7 dm. tall; leaves usually linear-lanceolate, acute, entire; bracts and calyces distally or wholly dull red-purple or dull red-orange, at least the upper bracts with a pair of lobes; calyx 9–17 mm. long, cleft medianly about half its length, laterally 2–3 mm. into lance-attenuate lobes; corolla 15–27 mm. long, its galea 8–19 mm. long, attenuate, glandular-puberulent dorsally, with purple thin margins, its lower lip 1–2 mm. long, dark green, protuberant-incurved; capsule 6–8 mm. long.

Bogs or moist soil, usually on serpentine, Humid Transition Zone; Klamath Mountains, southwestern Oregon and northwestern California. Type locality: Josephine County, Oregon. May–Aug.

4891. *Castilleja oblongifolia*4892. *Castilleja miniata*4893. *Castilleja elata*

50. *Castilleja oregonensis* Gandoger. Whited's Indian Paint-brush. Fig. 4894.

Castilleja oreopola var. *subintegra* Fernald, *Erythea* 6: 45. 1898.

Castilleja angustifolia var. *Whitedii* Piper, Bull. Torrey Club 27: 399. 1900.

Castilleja oregonensis Gandoger, Bull. Soc. Bot. Fr. 66: 217. 1919.

Plant perennial, glabrous or slightly pubescent below the villose inflorescence, the stems many, erect, herbaceous throughout, simple, 3–5 dm. tall. Leaves linear-lanceolate or lanceolate, acute, entire; bracts and calyces purple-red, the bracts mostly or all with a pair of lobes; calyx 15–18 mm. long, cleft medianly about two-fifths its length, laterally about 3 mm. into ovate obtuse to acute lobes; corolla 19–22 mm. long, its galea 9–11 mm. long, attenuate, minutely pubescent dorsally, with narrow purple-red thin margins, its lower lip 1–2 mm. long, dark green, protuberant-incurved; capsule 10 mm. long.

Granitic slopes, on talus or in open coniferous forest, Canadian and Hudsonian Zones; Wallowa and Blue Mountains of northeastern Oregon. June–Aug.

51. *Castilleja Dixonii* Fernald. Dixon's Indian Paint-brush. Fig. 4895.

Castilleja Dixonii Fernald, *Erythea* 7: 122. 1899.

Castilleja miniata var. *Dixonii* Nels. & Machr. Bot. Gaz. 61: 45. 1916.

Castilleja hyetophila Pennell, Proc. Acad. Phila. 86: 537. 1934.

Plant perennial, glabrous or minutely pubescent below the villose inflorescence, the stems solitary or few, sometimes shrubby at base, ascending or erect, simple to much-branched, 4–10 dm. tall. Leaves linear- to oblong-lanceolate, acute or acutish, entire; bracts and calyces scarlet or scarlet-red, the bracts mostly or all with a pair of lobes; calyx 20–25 mm. long, cleft medianly one-half its length, laterally 3–6 mm. into oblong acutish lobes; corolla 25–30 mm. long, its galea 13–16 mm. long, attenuate, pubescent dorsally, with narrow pale or reddish margins; its lower lip 1.5 mm. long, dark green, protuberant; capsule 10 mm. long.

Rocky beaches and headlands, Humid Transition Zone; along coast from southeastern Alaska to northwestern Washington. Type locality: Quinalt Indian Agency, Washington. May–Aug.

52. *Castilleja Peckiana* Pennell. Peck's Indian Paint-brush. Fig. 4896.

Castilleja Peckiana Pennell, *Notulae Naturae* No. 74: 9. 1941.

Plant perennial, pubescent with glandless hairs, the leaves cinereous, the stems hirsute, and the inflorescences villose-hirsute. Stems several or many, erect, simple or somewhat branched, 3–6 dm. tall. Leaves linear to linear-lanceolate, acute to obtusish, entire or the upper with a pair of small or slender lobes; bracts and calyces distally scarlet to grenadine- or carrot-red, the former with 1 or 2 pairs of slender lobes; calyx 13–23 mm. long, cleft medianly two-fifths its length, laterally 2–6 mm. into lance-attenuate to -oblong lobes; corolla 15–25 mm. long, its galea 8–12 mm. long, attenuate, minutely pubescent dorsally, with red thin margins, its lower lip 1–2 mm. long, dark green, rudimentary, knob-like (projecting-incurved); capsule 9–12 mm. long.

Sandy or rocky sagebrush or open pineland, Arid Transition Zone; plateau of central and eastern Oregon from Wasco County to Klamath County, and east to Baker and Harney Counties. Type locality: north of Sisters, Deschutes County, Oregon. May–Aug.

53. *Castilleja californica* Abrams. Southern California Indian Paint-brush, Fig. 4897.

Castilleja californica Abrams, Bull. S. Calif. Acad. 1: 68. 1902.

Plant perennial, pubescent or pilose with glandless hairs, the inflorescence villose-hirsute, the stems few or several, erect, simple or somewhat virgately branched, 4–8 dm. tall. Leaves linear or nearly so, attenuate, entire or the upper with 1 or 2 pairs of slender lobes, usually with axillary fascicles of little leafy shoots; bracts and calyces distally scarlet or scarlet-red, the former with a pair of slender lobes; calyx 12–27 mm. long, cleft medianly two-fifths to three-fifths its length, laterally 3–5 mm. into lanceolate lobes; corolla 15–45 mm. long, its galea 9–27 mm. long, attenuate, finely pubescent dorsally, with red thin margins, its lower lip 1–2 mm. long, dark green or becoming dark brown, rudimentary, spreading-incurved; capsule 10–15 mm. long.

Chaparral, sagebrush and open forest, Upper Sonoran Zone; near the coast, San Luis Obispo County, California, to northern Lower California, and on Santa Catalina Island. Type locality: Big Tejunja Wash, Los Angeles County, California. Feb.–July.

54. *Castilleja Douglasii* Benth. Douglas' Indian Paint-brush. Fig. 4898.

Castilleja Douglasii Benth. in A. DC. Prod. 10: 530. 1846.

Castilleja multisecta Eastw. Leaflets West. Bot. 1: 174. 1935. Not A. Nels. 1912.

Castilleja polytoma Eastw. op. cit. 195. 1936.

Plant perennial, woody below, pilose-pubescent with glandless hairs, the inflorescence hirsute, the stems few or several, ascending or erect, simple or little branched, 4–5 dm. tall. Leaves lanceolate, with 1 to 3 pairs of slender lobes, and without axillary leafy fascicles; bracts and calyces distally scarlet or scarlet-red, the former with 2 or 3 pairs of lobes; calyx 18–25 mm. long, cleft medianly about half its length, laterally 3–7 mm. into ovate to linear-oblong lobes; corolla (25–)30–37 mm. long, its galea 16–23 mm. long, attenuate, finely pubescent dorsally, with red thin margins, its lower lip 1.5–2 mm. long, dark green or dark brown, rudimentary, spreading-incurved; capsule 12–13 mm. long.

Open coniferous forest, Humid Transition Zone; coast and coastal mountains, Alameda to San Benito and Monterey Counties, California. Type locality: California. March-May.

Castilleja Douglasii subsp. *insularis* (Eastw.) Pennell. (*Castilleja latifolia* var. *insularis* Eastw. Leaflets West. Bot. 1: 238. 1936.) Corolla only 15 mm. long. Upper Sonoran Zone; Santa Cruz Island, Channel Islands, southern California. Type locality: Santa Cruz Island, Santa Barbara County. April.

55. *Castilleja neglecta* Zeile. Tiburon Indian Paint-brush. Fig. 4899.

Castilleja neglecta Zeile in Jepson, Man. Fl. Pl. Calif. 936. 1925.

Plant perennial, suffrutescent or shrubby below, the many herbaceous stems erect, much-branched, 3-6 dm. tall. Leaves lanceolate, with 1 or 2 pairs of slender lobes; bracts and calyces distally light yellow, or bracts becoming purplish, the mid-blades of the bracts rounded; calyx 15 mm. long, cleft medianly two-fifths its length, laterally 5-6 mm. into oblong-ovate ciliate lobes; corolla 18-20 mm. long, its galea 9-10 mm. long, finely pubescent dorsally distally, with red or orange-red thin margins, its lower lip 2 mm. long, pale or translucent green, rudimentary, appressed; capsule at least 10 mm. long.

Open serpentine, Upper Sonoran Zone; Tiburon Peninsula, San Francisco Bay, California. Type locality: Tiburon, Marin County, California. April-July.

56. *Castilleja chromosa* A. Nels. Desert Indian Paint-brush. Fig. 4900.

Castilleja chromosa A. Nels. Bull. Torrey Club 26: 245. 1899.

Plant perennial, herbaceous, hispid-hirsute with spreading glandless hairs. Stems several, erect, simple or somewhat branched, 2-4 dm. tall; leaves linear-lanceolate, with 1 or 2 pairs of widely spreading slender lobes; bracts and calyces distally scarlet or scarlet-red, the former with 2 pairs of slender lobes; calyx 20-21 mm. long, cleft medianly one-third its length, laterally 2-3 mm. into ovate obtuse to rounded lobes; corolla 25 mm. long, its galea 13-15 mm. long, obscurely puberulent dorsally, with wide reddish or red thin margins, its lower lip 2-3 mm. long, dark green, rudimentary, hidden within calyx-tube; capsule 15-16 mm. long.

Sandy or gravelly soil, usually among sagebrush, Upper Sonoran Zone; interior plateaus, eastern Oregon to southeastern California, east to Wyoming, Colorado, and New Mexico. Type locality: Leroy, Uinta County, Wyoming. March-Aug.

57. *Castilleja hispida* Benth. Harsh Indian Paint-brush. Fig. 4901.

Castilleja hispida Benth. ex Hook. Fl. Bor. Amer. 2: 105. 1838.

Plant perennial, herbaceous, hirsute with glandless hairs, the inflorescence villose. Stems several, herbaceous, erect, simple or slightly branched, 2-4 dm. tall; leaves lanceolate to ovate, distally with 2 to 3 pairs of ascending slender lobes; bracts and calyces distally scarlet or scarlet-red, or varying toward orange; calyx 20-25 mm. long, cleft medianly two-fifths its length, laterally 4-5 mm. into oblong rounded lobes; corolla 25-30 mm. long, its galea 12-15 mm. long, puberulent or minutely pubescent dorsally, with reddish thin margins, its lower lip 1-2 mm. long, dark green, rudimentary; capsule at least 11 mm. long.

Sagebrush and open coniferous forest, Transition Zones; coastal Washington and Oregon east to western Montana. Type locality: Fort Vancouver, Washington. April-July.

Castilleja hispida subsp. *abbreviata* (Fernald) Pennell. (*Castilleja angustifolia* var. *abbreviata* Fernald. Erythra 6: 49. 1898; *C. remota* Greene, Pittonia 4: 2. 1899.) Stem and leaves pilose, the stem relatively slender; main leaves usually shorter, and with 1 or 2 pairs of lobes; bracts with yellow cross-band more sharply defined. Rock ledges and banks, Canadian and Hudsonian Zones; Vancouver Island to the Olympic Mountains of Washington and the Cascade Mountains of northern Oregon, east to southern Alberta and northwestern Montana. Type locality: Olympic Mountains, Washington. May-Aug.

Castilleja hispida subsp. *acuta* Pennell, Notulae Naturae No. 74: 11. 1941. Calyx-lobes acute, lanceolate to ovate; main leaves with 1 pair of lobes, or else entire; stem 3-4 dm. tall. Sandy or gravelly openings in coniferous forest. Transition Zones to Hudsonian Zone; northwestern to eastern Oregon, east to western Montana. Type locality: Adams Creek, Wallowa Mountains, Wallowa County, Oregon. May-Aug.

58. *Castilleja oreopola* Greenm. Rosy Indian Paint-brush. Fig. 4902.

Castilleja oreopola Greenm. Bot. Gaz. 25: 264. 1898.

Plant perennial, herbaceous, glabrous or slightly pilose, the inflorescence villose-hirsute. Stems many, erect, simple, 1.5-3 dm. tall; leaves lanceolate to ovate, with 1 or 2 pairs of spreading slenderly attenuate lobes; bracts and calyces distally rose-red to red; calyx 18-23 mm. long, cleft medianly one-half its length, laterally 4-7 mm. into ovate-oblong acutish to rounded lobes; corolla 21-23 mm. long, its galea 10-11 mm. long, puberulent dorsally, with wide purplish or pale thin margins, its lower lip 1-2 mm. long, dark green, rudimentary, hidden within calyx-tube; capsule 11 mm. long.

Alpine meadows and glades in coniferous forest, Hudsonian and Arctic-Alpine Zones; Cascade Range from Mount Rainier, Washington, to Three Sisters Peaks, Oregon. Type locality: Mount Adams, Washington. June-Sept.

Castilleja oreopola subsp. *olympica* Pennell, Proc. Acad. Phila. 99: 188. 1947. Bracts mallow-purple or nearly so; corolla somewhat smaller, 17-20 mm. long; leaves narrower, those of the middle portion of the stem 3-6 mm. wide. Alpine meadows and glades in coniferous forest, Hudsonian and Arctic-Alpine Zones; Olympic Mountains, Washington. Type locality: Bogachiel Ridge, above Sol Duc Hot Springs, Clallam County, Washington. July-Aug.

Castilleja oreopola subsp. *albida* Pennell, loc. cit. Bracts whitish or dull yellow; corolla much smaller, 12-17 mm. long; leaves of middle portion of stem only 2-5 mm. wide. Alpine meadows and rocky slopes, Hudsonian and Arctic-Alpine Zones; Green Mountains, southern British Columbia, to northern Cascade Range, from Mount Baker to Mount Stuart, northern Washington. Type locality: Mount Pugh, Snohomish County, Washington. July-Aug.

59. *Castilleja rupicola* Piper. Cliff Indian Paint-brush. Fig. 4903.

Castilleja rupicola Piper ex Fernald, *Erythea* 6: 45. 1898.

Castilleja Andrewsii Henderson, *Madroño* 3: 31. 1935.

Plant perennial, herbaceous, minutely pubescent with glandless hairs, the inflorescence villous, the stems many, ascending or erect, simple, 0.7–1.5 dm. tall. Leaves linear-lanceolate, with 2 pairs of lobes, all segments attenuate, acute; bracts and calyces distally scarlet-red; calyx 18–21 mm. long, cleft medianly two-fifths to one-half its length, laterally 3–6 mm. into ovate-oblong or oblong-obtuse or rounded lobes; corolla 25–35 mm. long, much exceeding calyces and bracts, its galea 15–20 mm. long, puberulent dorsally, with narrow red thin margins, its lower lip 2 mm. long, dark green, rudimentary; capsule 10 mm. long.

Rock-ledge of cliffs, Hudsonian and Arctic-Alpine Zones; Cascade Range, from southern British Columbia and Mount Baker, Washington, south to Three Sisters Peaks, Oregon. Type locality: Paradise Valley, Mount Rainier, Washington. June–Aug.

60. *Castilleja gleasonii* Elmer. Mount Gleason Indian Paint-brush. Fig. 4904.

Castilleja gleasonii Elmer, *Bot. Gaz.* 39: 51. 1905.

Castilleja Douglasii var. *contentiosa* J. F. Macbride, *Contr. Gray Herb.* No. 65: 44. 1922.

Plant perennial, pubescent with hairs many or most of which are branched, the inflorescence finely lanulose-villous. Stems woody near base, branched, 3–8 dm. tall; leaves linear-lanceolate, entire or with 1 or 2 pairs of lobes; bracts and calyces distally scarlet-red, the former with 1 or 2 pairs of lobes, the segments obtuse or rounded; calyx in anthesis 20 mm. long, cleft medianly two-fifths its length, laterally 1–3 mm. into ovate obtuse lobes; corolla 22–25 mm. long, its galea 15 mm. long, pubescent dorsally, with wide reddish thin margins, its lower lip 2 mm. long, dark green, rudimentary, spreading, enclosed within calyx-tube; capsule 15 mm. long.

Sandy or rocky soil, Upper Sonoran and Transition Zones; coastal lowland and mountains from San Luis Obispo County to Los Angeles County, California. Type locality: Mount Gleason, near Acton, Los Angeles County, California. Feb–June.

61. *Castilleja pruinosa* Fernald. Pruinose Indian Paint-brush. Fig. 4905.

Castilleja pruinosa Fernald, *Erythea* 6: 50. 1898.

Castilleja nevadensis Eastw. *Leaflets West. Bot.* 1: 175. 1935.

Castilleja globosa Eastw. *op. cit.* 2: 242. 1940.

Castilleja muscipula Eastw. *loc. cit.*

Castilleja muscipula var. *armeniaca* *loc. cit.*

Castilleja muscipula var. *angustifolia* Eastw. *op. cit.* 243.

Plant perennial, pubescent with hairs many or most of which are branched, the inflorescence finely lanulose-villous. Stems several or many, herbaceous, or woody at base, simple or usually branched, 3–7 dm. tall; leaves linear-lanceolate, entire or the upper sometimes with a pair of lobes; bracts and calyces distally scarlet-red or scarlet, the former with a pair of lobes, the latter with a yellow zone above base of lobes; calyx 13–17 mm. long, cleft medianly two-fifths its length, laterally 3–5 mm. into lance-attenuate lobes; corolla 25–30 mm. long, its galea 15–20 mm. long, yellowish, pubescent dorsally, with wide reddish thin margins, its lower lip 2 mm. long, dark green, rudimentary, appressed; capsule 11–16 mm. long.

Rocky soil, basalt, schist, or serpentine, Transition and Canadian Zones; from Mount Jefferson in Cascade Mountains of western Oregon south through the Klamath Mountains of southwestern Oregon and northwestern California, and along the Sierra Nevada to Tuolumne County, California. Type locality: Swan Lake Valley, Klamath County, Oregon. April–Aug.

62. *Castilleja foliolosa* Hook. & Arn. Woolly Indian Paint-brush. Fig. 4906.

Castilleja foliolosa Hook. & Arn. *Bot. Beechey* 154. 1833.

Castilleja clementis Eastw. *Bull. Torrey Club* 32: 212. 1905.

Plant perennial, whitened throughout by a soft tomentum of branched hairs. Stems woody and much-branched below, distally herbaceous, the ultimate branches slender and simple, the intricate clumps 3–6 dm. tall; leaves linear or oblong-linear, obtuse, entire, the lower axils abundantly foliolose with little leaves on abbreviated shoots; bracts and calyces distally scarlet-red, the former with 1 or 2 pairs of lobes, the latter yellow between its green basal and abruptly red distal portions; calyx 16–21 mm. long, cleft medianly two-fifths its length, laterally 0.5 mm. or less or its rounded lobes wholly united into a rounded-truncate tip; corolla 18–26 mm. long, its galea 7–18 mm. long, minutely pubescent dorsally, with wide pale reddish thin margins, its lower lip 2 mm. long, dark green, rudimentary, appressed, hidden within the calyx-tube; capsule 10 mm. long.

Sandy or gravelly chaparral, Upper Sonoran and Transition Zones; near the coast and in the Coast Ranges, and also inland along the western base of the Sierra Nevada from Humboldt County, northwestern California, south to northern Lower California. Type locality: San Francisco or Monterey, California. Jan.–July.

63. *Castilleja hololeuca* Greene. White-felted Indian Paint-brush. Fig. 4907.

Castilleja hololeuca Greene, *Pittonia* 1: 39. 1887.

Plant perennial, whitened throughout by an arachnoid-lanose coat of long flexuous hairs. Stems woody and much-branched through most of length, the herbaceous distal stems short, the plants altogether at least 4–5 dm. tall; leaves linear, entire, obtuse, most axils abundantly foliolose with little leaves on abbreviated shoots; bracts and calyces distally red, the former with 1 pair of lobes; calyx 18–19 mm. long, cleft medianly two-fifths its length, laterally not at all,



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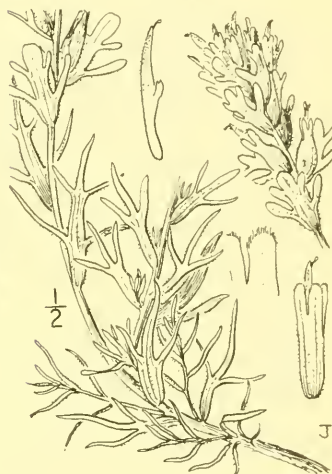
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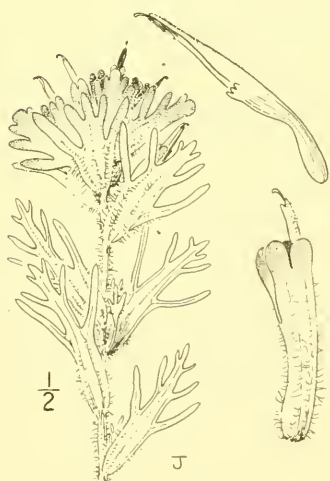
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4894. *Castilleja oregonensis*
 4895. *Castilleja Dixonii*
 4896. *Castilleja Peckiana*

4897. *Castilleja californica*
 4898. *Castilleja Douglasii*
 4899. *Castilleja neglecta*

4900. *Castilleja chromosa*
 4901. *Castilleja hispidula*
 4902. *Castilleja oreopola*

the sepals of each side wholly united to a rounded tip; corolla about 20 mm. long, its galea 12-13 mm. long, slightly puberulent dorsally, with pale thin margins, its lower lip 2-3 mm. long, dark green, rudimentary, hidden within calyx; capsule 9-11 mm. long.

Chaparral, Upper Sonoran Zone; Channel Islands, southern California. Type locality: Santa Cruz Island, California. July-Aug.

64. *Castilleja grisea* Dunkle. Gray-leaved Indian Paint-brush. Fig. 4908.

Castilleja grisea Dunkle, Bull. S. Calif. Acad. 42: 31. 1943.

Plant perennial, grayish-cinereous throughout with short arachnoid tomentum. Stems woody and much-branched through most of length, the herbaceous distal portion short and similarly branched (stems soon lignifying), the plants altogether 5-6 dm. tall; leaves linear, obtuse, entire, foliolose in most axils; bracts and calyces green or brownish green, the former with 1 pair of lobes, the segments all lance-oblong; calyx 13 mm. long, cleft medianly two-thirds its length, laterally 0.5 mm. or less or its rounded lobes wholly united into a rounded-truncate tip; corolla about 15 mm. long, its galea 7 mm. long, puberulent distally dorsally, with pale narrow thin margins, its lower lip 2 mm. long, dark green, rudimentary, appressed; capsule 11 mm. long.

Bluffs, Upper Sonoran Zone; San Clemente Island, southern California. Type locality: above Pyramid Cove, San Clemente Island. Feb.-April.

65. *Castilleja plagiòtoma* A. Gray. Mojave Indian Paint-brush. Fig. 4909.

Castilleja plagiòtoma A. Gray, Proc. Amer. Acad. 19: 93. 1883.

Plant perennial, sparsely pilose with short and weak glandless hairs below the pubescent inflorescence, the calyces lanuginous. Stems herbaceous, slender, much-branched, 5-6 dm. tall or more; leaves lanceolate, with 1 or 2 pairs of lance-linear lobes; bracts green, with rounded segments; calyx pale, 16-19 mm. long, cleft laterally more deeply than medianly, its tube 8-10 mm. long, its upper lip 4-7 mm. long, cleft medianly 2-3 mm. into acute or obtuse lobes, its lower lip 6-9 mm. long, wider and hardly cleft at the rounded apex; corolla 18 mm. long, its galea 11 mm. long, yellow, pubescent dorsally, with wide pale thin margins, its lower lip 1.5 mm. long, yellowish, rudimentary, apparently concealed by the lower calyx-lip (the lanuginous expanded apex of which closes against the midportion of the elongated galea); capsule 9-10 mm. long.

Among sagebrush and other desert bushes, Lower Sonoran Zone; southern Mojave Desert, California. Type locality: Mojave Desert. April-May.

66. *Castilleja linariaefòlia* Benth. Linaria-leaved Indian Paint-brush. Fig. 4910.

Castilleja linariaefolia Benth. in A. DC. Prod. 10: 532. 1846.

Castilleja candens Dur. & Hilg. Journ. Acad. Phila. II. 3: 43. 1855.

Castilleja affinis var. *linariaefolia* Zeile in Jepson, Man. Fl. Pl. Calif. 938. 1925.

Castilleja salticola Eastw. Leaflets West. Bot. 2: 284. 1940.

Castilleja Howellii Eastw. op. cit. 3: 89. 1941.

Plant perennial, glabrous or finely pubescent on stem and leaves, but the stem near base bearing spreading pubescence and the inflorescence hirsute-pubescent. Stems several or many, herbaceous, simple or little branched, 6-8 dm. tall; leaves linear to linear-lanceolate, entire or with a pair of slender lobes; bracts and calyces distally scarlet-red to rose-red, the former with 1 or 2 pairs of divaricate slender lobes; calyx 25-30 mm. long, cleft medianly more deeply ventrally (nearly two-thirds its length) than dorsally (less than one-third its length), laterally 5-7 mm. into lance-attenuate lobes which upcurve together distally; corolla 35-40 mm. long, decurved, its galea 20-23 mm. long, finely pubescent dorsally, with red thin margins, its lower lip 3 mm. long, dark green, rudimentary, ascending, with attenuate lobes; capsule 11-13 mm. long.

Among sagebrush and junipers, Upper Sonoran and Transition Zones; interior plateaus, central Oregon to southeastern California, east to Montana and New Mexico. Type locality: eastern Wyoming. June-Aug.

67. *Castilleja subinclùsa* Greene. Long-leaved Indian Paint-brush. Fig. 4911.

Castilleja subinclusa Greene, Pittonia 4: 2. 1899.

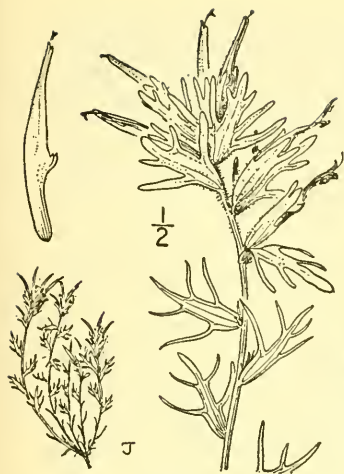
Plant perennial, finely and rather sparsely pubescent, the inflorescence with somewhat longer gland-tipped hairs, the stems presumably several, herbaceous, 8 dm. tall or more, simple or somewhat branched. Leaves linear, simple; bracts and calyces distally purple- to scarlet-red; calyx in anthesis 30-32 mm. long, cleft medianly more deeply ventrally (two-thirds its length) than dorsally (slightly less than one-third its length), laterally 5-7 mm. into linear-attenuate lobes, which upcurve above the decurving galea; corolla 35-50 mm. long, its galea 18-19 mm. long, finely pubescent dorsally, with red thin margins, its lower lip 3 mm. long, dark green, rudimentary, appressed; capsule 13-15 mm. long.

Foothills, Upper Sonoran and Transition Zones; western slope of Sierra Nevada from Butte County to Calaveras County, California. Type locality: Amador County, California. April-June.

68. *Castilleja franciscàna* Pennell. Franciscan Indian Paint-brush. Fig. 4912.

Castilleja franciscana Pennell, Proc. Acad. Phila. 99: 188. 1947.

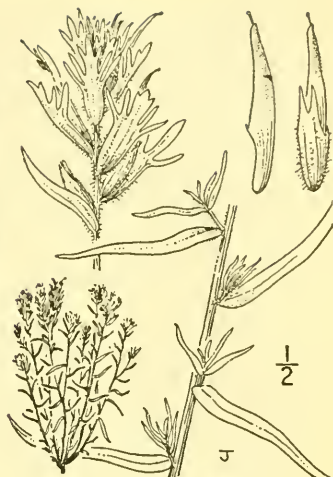
Plant perennial, pilose-pubescent with recurved glandless hairs, the inflorescence more hairy, slightly villose-hirsute. Stems several, herbaceous, suffrutescent at the decumbent base, simple



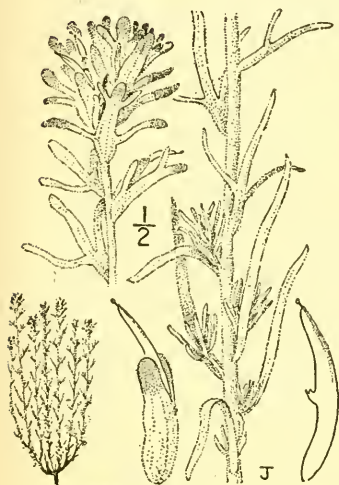
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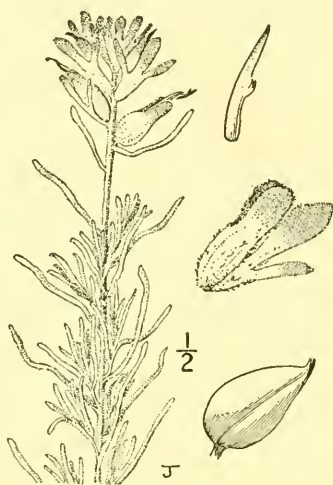
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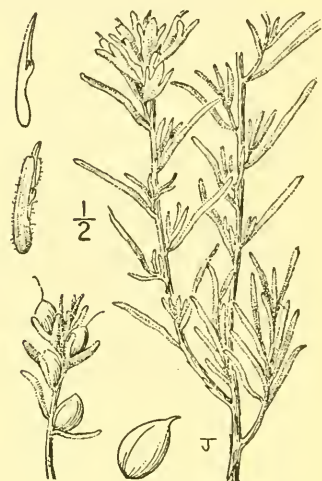
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4903. *Castilleja rupicola*
 4904. *Castilleja gleasonii*
 4905. *Castilleja pruinosa*

4906. *Castilleja foliolosa*
 4907. *Castilleja hololeuca*
 4908. *Castilleja grisea*

4909. *Castilleja plagiotoma*
 4910. *Castilleja linariaefolia*
 4911. *Castilleja subinclusa*

or somewhat branched, 3-7 dm. tall; leaves linear-lanceolate to lanceolate, entire or with a pair of slender lobes; bracts distally and calyces scarlet or scarlet-red, or duller; calyx 25-35 mm. long, with decurved tube, cleft medianly more deeply ventrally (one-half its length) than dorsally (one-fourth to one-third its length), laterally 3-5 mm. into linear-lanceolate to oblong-lanceolate lobes which upcurve about the decurving galea; corolla 35-45 mm. long, its galea 20-25 mm. long, stout, pubescent dorsally, with wide yellow or reddish thin margins, its lower lip 3 mm. long, dark green, rudimentary, appressed; capsule at least 10 mm. long.

Among chaparral and other bushy growth, Upper Sonoran and Transition Zones; along coast from Mendocino County to Ventura County, California. Type locality: east of upper Crystal Springs Lake, southwest of San Mateo, San Mateo County, California. March-June.

69. *Castilleja stenántha* A. Gray. Large-flowered Annual Indian Paint-brush.
Fig. 4913.

Castilleja stenantha A. Gray, Syn. Fl. N. Amer. 2¹: 295. 1878.

Plant annual, pubescent throughout with spreading glandless (or with some interspersed gland-tipped) hairs, the stems simple or somewhat branched, 5-10 dm. tall. Leaves lanceolate-attenuate, entire; bracts leaf-like, those at stem-apex erect and distally scarlet, but by anthesis those subtending the opened flowers green throughout and spreading-ascending; calyx green, 23-25 mm. long, cleft medianly nearly two-thirds its length, laterally 0.5-3 mm. into linear-attenuate or merely acute lobes; corolla 25-35 mm. long, its galea 15-20 mm. long, dull yellow dorsally, with narrow pale thin margins, its lower lip 2-3 mm. long, yellow, horizontally projecting; capsule 12 mm. long.

Moist soil, streamsides or marshes, Lower Sonoran and Transition Zones; central and southwestern California from Lake County to Monterey, Fresno and San Diego Counties. Type locality: vicinity of Fort Tejon, California. April-Aug.

70. *Castilleja éxilis* A. Nels. Small-flowered Annual Indian Paint-brush.
Fig. 4914.

Castilleja stricta Rydb. Mem. N.Y. Bot. Gard. 1: 354. 1900. Not Benth. 1846.

Castilleja exilis A. Nels. Proc. Biol. Soc. Wash. 17: 100. 1904.

Plant annual, rough-pubescent with spreading glandless and often or mainly with interspersed gland-tipped hairs; the stems simple or occasionally branched, 3-8 dm. tall. Leaves lanceolate-attenuate, entire; bracts leaf-like, those at stem-apex erect and distally scarlet, but by anthesis those subtending the opened flowers mostly or wholly green and spreading-ascending; calyx green, 18 mm. long, cleft medianly two-thirds its length, laterally 1.5-3 mm. into lance-attenuate lobes; corolla 15-20 mm. long, its galea 7-9 mm. long, dull yellow, pubescent dorsally, with wide purplish or reddish thin margins, its lower lip 2-3 mm. long, yellowish, ascending-appressed, with whitish lobes; capsule 9-10 mm. long.

Moist grassy soil, often at edges of alkali marshes, Upper Sonoran Zone; arid interior plateaus, central northern Washington to central southern Oregon, east to Montana and Colorado. Type locality: Ruby Valley, Nevada. June-Sept.

71. *Castilleja spiràlis* Jepson. Dark-lipped Annual Indian Paint-brush.
Fig. 4915.

Castilleja spiralis Jepson, Fl. W. Mid. Calif. 412. 1901.

Plant annual, pubescent with spreading intermixed glandless and gland-tipped hairs, the stems simple or branched, 6-9 dm. tall. Leaves lanceolate-attenuate, entire; bracts shorter and wider than leaves, the young ones at stem-apex erect and tipped with scarlet-red, but by anthesis those subtending the opened flowers green and spreading-ascending; calyx green, 17-20 mm. long, cleft medianly five-eighths its length or more, laterally 0.5-2 mm. long into attenuate or acute lobes; corolla 23-28 mm. long, its galea 9-15 mm. long, dull yellow, distally purplish and pubescent dorsally, with narrow thin margins, its lower lip 2-3 mm. long, purple-red, ascending-appressed; capsule 9-10 mm. long.

Moist soil along streams, Upper Sonoran Zone; central California from Lake and Napa Counties to Tuolumne County. Type locality: Butt's Canyon, Napa County, California. June-Sept.

31. *CORDYLÁNTHUS* Nutt. ex Benth. in A. DC. Prod. 10: 597. 1846.

Branched annual herbs, with yellow roots, alternate entire or dissected leaves, and spikes of dull yellow or purple flowers. Bracts subtending flowers either leaf-like or so modified as to seem a part of the calyces. Bracteoles none. Calyx with its component sepals united into a single piece, which is split nearly or quite to base ventrally but dorsally extends as a tongue-like structure that is either bifid or entire at apex. Corolla 2-lipped, the upper galeate and rounded to sagittally compressed around the anthers, the lower lip shorter or usually as long, somewhat inflated and with free or coalescent minute lobes. Stamens 4 or 2, the anther-cells unequally placed and the lower sometimes smaller or aborted. Capsule turgid, glabrous, loculicidal. Seeds many, wingless, the loose testa reticulate. [Name Greek, meaning club and flower.]

Species about 40, of western North America. Type species, *Cordylanthus filifolius* Nutt.

Leaves lanceolate to oblong, at least the lower entire; inflorescence an elongated spike, the bracts uniform, entire to pinnately lobed, nearly equaling to exceeding the corollas; calyx ample and spathe-like, enclosing proximal portion of corolla.

I. HEMISTEGIA.

Leaves or leaf-segments linear to filiform; inflorescence of head-like clusters (abbreviated spikes) of 1 to many flowers, the immediate flowering bracts usually modified and calyx-like; calyx itself narrow, enclosing the corolla (partially or wholly) only at base.

II. EUCORDYLANTHUS.

I. HEMISTEGIA.

Stamens 4; bracts entire to distally short-lobed; leaves acute.

Bracts usually with a pair of short distal lobes; corolla 18–20 mm. long, shorter than calyx, its throat moderately inflated, the lower lobes and thin margin of upper lip purple; leaves dark green, soon glabrescent except for ciliate margins; hairs filiform, some tipped with minute dark glands.

1. *C. maritimus*.

Bracts entire; corolla 15–17 mm. long, exceeding calyx, its throat slightly inflated, the lower lobes and thin margin of upper lip yellowish; leaves pale green, the upper tardily glabrescent; hairs exuding a white waxy excretion.

2. *C. canescens*.

Stamens 2; bracts with more (3–5) and deeper lobes; leaves obtuse or rounded.

Corolla 13–15 mm. long, little inflated, the galea only slightly compressed sagittally.

Calyx bidentate at apex; corolla purplish, its galea dorsally with reflexed hairs; bracts with shorter hairs or even glabrescent; axillary fascicles not developed.

Bracts with spreading lobes, purple (at least distally), ciliate and on veins beneath somewhat pubescent, some of the hairs gland-bearing; corolla-lobes longer than the throat.

3. *C. palmatus*.

Bracts with more ascending lobes, pubescent over entire surface to ciliate so or glabrescent, the hairs not glandular; corolla-lobes with more conspicuous membranous margins and about as long as the throat.

4. *C. carnulosus*.

Calyx entire at apex; corolla cream-white, its galea dorsally with spreading hairs; bracts and leaves hirsute-hispid, the former with spreading lobes; axillary fascicles much developed.

5. *C. hispidus*.

Corolla yellowish, 17–18 mm. long, decidedly inflated, the galea strongly compressed sagittally, both lips pubescent externally with spreading hairs; bracts villose-hirsute.

6. *C. mollis*.

II. EUCORDYLANTHUS.

Stamens 4, the filaments bearded (at least proximally); throat plus lips of corolla nearly as long as or usually longer than the basal tube; calyx little, if at all, shorter than the flowering bract, its apex cleft less than 2 mm.

Galea not or scarcely longer than the lower corolla-lip, usually pale or dull in color and pressed against it, the throat and lower lip horizontally expanded.

Corolla 10–30 mm. long; flowering bracts with slender hairs.

Anthers 2-celled; corolla somewhat pubescent, more than twice as long as wide, the distal margins of the lower lip thickened; spikes 1–15-flowered, the flowers with dorsal side uppermost; flowering bracts with fine hairs quite like those of other leaves of inflorescence.

Flowering bracts with 1 to 3 pairs of pinnately disposed lobes; calyx cleft distally about 1.5 mm.; spike either without special subtending leaves or with such palmately 5-lobed.

A. KINGIANI.

Flowering bracts toothed to entire at apex; calyx distally bidentate (to 0.5 mm.) to entire; spikes head-like, subtended by several special leaves (outer bracts).

Throat of corolla pubescent within ventrally; outer bracts palmately 3–7-lobed.

B. RAMOSI.

Throat of corolla glabrous or nearly so within ventrally; outer bracts 3-lobed or entire.

Inflorescences of dense head-like clusters, each 3–15-flowered and subtended by several 3-lobed outer bracts; plants with glandless hairs.

C. RIGIDI.

Inflorescences of racemously disposed small clusters, each 1–3-flowered and subtended by one or a few simple or 3-lobed outer bracts; plants often with gland-bearing hairs.

D. TENUES.

Anthers 1-celled; corolla wholly glabrous, less than or about twice as long as wide, the distal margins of the lower lip thin; spikes 1–3-flowered, the flowers inverted so that the ventral side is uppermost; flowering bracts setose-pilose.

E. NEVINIANI.

Corolla 8 mm. long; flowering bracts entire and pilose with stout yellowish glands that are slightly higher than long, the plants otherwise glandless.

F. PRINGLEANI.

Galea longer than and upcurved away from lower corolla-lip, throat open and the inverted corolla bright purple; outer bracts of the single-flowered capitula 3-lobed; plants with glandular hairs.

G. LAXIFLORI.

Stamens 2, the filaments glabrous and the anthers 1-celled; throat plus lips of corolla shorter than the basal tube; calyx much shorter than the flowering bract, its apex cleft about 3 mm.

H. CAPITATI.

A. KINGIANI.

Only species in Pacific states.

7. *C. Helleri*.

B. RAMOSI.

Outer bracts equaling the length of the flowering bract, calyx, and corolla, these structures greenish or dull purplish; plants more widely and equally laxly branched.

8. *C. ramosus*.

Outer bracts much shorter than the flowers; plants with more stiffly ascending branches.

Inflorescence purplish, strongly contrasted in color with the whitened foliage; corolla purplish; outer bracts 5–7-lobed; leaves silvery green, the main cauline ones 2–2.5 cm. long; plants more virgate, the branches shorter.

9. *C. eremicus*.

Inflorescence yellowish, only slightly contrasted in color with the foliage; corolla yellow; outer bracts 3–5-lobed; leaves yellowish green, the main cauline ones 1–1.5 cm. long; plants with widely ascending branches.

10. *C. bernardinus*.

C. RIGIDI.

Outer bracts, with their lobes, not or scarcely widened distally; spikes not or relatively softly setose-ciliate, the flowers less densely crowded; plants more widely branched.

Corolla 13–16 mm. long, its lower lip externally sparsely pubescent, the flowers 3 to 5 in a cluster; plants finely pubescent, or the bracts glabrescent, the latter ciliate.

11. *C. Ferrisianus*.

- Corolla 17–21 mm. long, its lower lip externally pubescent; plants softly pubescent throughout.
- Plants 3–6 dm. tall, diffusely and very widely branched; flowers 4 to 6 in a cluster, each corolla 20–21 mm. long; bracts finely pubescent, but nearly ciliate. 12. *C. littoralis*.
- Plants 4–12 dm. tall, with many ascending-spreading branches; flowers 5 to 10 in a cluster, each corolla 17–21 mm. long; bracts setosely ciliate and pilose. 13. *C. platycephalus*.
- Outer bracts, and usually their lobes, clearly widened distally; spikes more harshly setose-pilose; plants with ascending branches.
- Throat of corolla longer than wide, hardly distinguishable from tube; outer bracts with linear-oblancoate plane bodies, their width little (less than twice) or not exceeded by the spreading setae, the bracts green to apex; corolla 12–14 mm. long.
- Plant laxly branched, several or many of the lateral branches exceeding the central stem; outer bracts setose-hairy as well as ciliate, less obviously widened distally; flowers 3 to 6 in a loose head, the corolla presumably dull yellowish. 14. *C. rigidus*.
- Plant more strictly branched, the lateral branches stricter and more erect, only the uppermost sometimes exceeding the central stem; outer bracts setose-ciliate, but slightly or not setose otherwise; flowers 5–15 in a compact head, the corolla light yellow, proximally dark brown within throat. 15. *C. compactus*.
- Throat of corolla wider than long, strongly contrasted with tube; outer bracts with filiform-oblancoate bodies, their width much (at least twice) exceeded by the spreading setae, the bracts with blackish violet callose tips; corolla 14–16 mm. long, white, with dull purple wide antero-lateral lines. 16. *C. filifolius*.

D. TENUES.

- Outer bracts 3-lobed, the segments with enlarged tips.
- Plants diffusely spreading, the slender stems extensively procumbent; corolla 14–15 mm. long, its galea relatively pubescent distally; outer bracts with long spreading lobes. 17. *C. nidularius*.
- Plants erect, with many ascending branches; corolla with galea more finely pubescent.
- Flower-clusters brownish or purplish, hirsute; corolla with relatively dark galea; plants more glandular.
- Lobes of outer bracts linear, flat, often relatively distally placed; corolla 15–18 mm. long. 18. *C. Hansenii*.
- Lobes of outer bracts narrowly linear or filiform, often involute, more proximally placed; corolla 13–16 mm. long. 19. *C. viscidus*.
- Flower-clusters light yellow-green, finely pubescent (the bracts ciliate); corolla with galea white; plants finely pubescent, the hairs on stem beneath inflorescence gland-tipped, but elsewhere glabrous. 20. *C. pallescens*.
- Outer bracts entire, or angulate-dilated at apex.
- Inflorescence hirsute, the ciliation of the bracts relatively long; leaves linear, usually flat; stem pubescent to hirsute over entire surface.
- Tips of outer bracts enlarged, usually angulate (to rudimentary bases of one or both lateral lobes).
- Plant hirsute with slender glandless hairs that much exceed the short gland-tipped ones; main cauline leaves widely linear; branches strongly ascending. 21. *C. pilosus*.
- Plant canescent-pubescent with fine glandless hairs, but with gland-bearing hairs on stems below inflorescences; main cauline leaves linear or narrowly linear; branches widely ascending-spreading, diffuse. 22. *C. diffusus*.
- Tips of outer bracts not or scarcely enlarged, not angulate though often callose; plant pubescent, glandularly so above or throughout. 23. *C. Bolanderi*.
- Inflorescence merely pubescent, the bracts finely ciliate; leaves narrowly linear or filiform, mostly involute; stem glabrous, or bifariously minutely pubescent.
- Tips of outer bracts enlarged, often essentially angulate-lobed; corolla pale or white, with conspicuous dark maroon-purple streaks; plants diffusely branched, the flowers solitary. 24. *C. brunneus*.
- Tips of outer bracts not or scarcely enlarged, not angular nor strongly callose; corolla greenish yellow, the galea wholly brown, the throat laterally purple-brown, but with less conspicuous or no dark lines; plants with many ascending branches, the flowers in clusters of 1–3. 25. *C. tenuis*.

E. NEVINIANI.

Only species in Pacific States.

26. *C. Nevinii*.

F. PRINGLEANI.

Only species.

27. *C. Pringlei*.

G. LAXIFLORI.

Only species in Pacific States.

28. *C. parviflorus*.

H. CAPITATI.

Only species in Pacific States.

29. *C. capitatus*.

1. *Cordylanthus marítimus* Nutt. Salt-marsh Bird's-beak. Fig. 4916.

Cordylanthus marítimus Nutt. ex Benth. in A. DC. Prod. 10: 598. 1846.

Chloropyron palustre Behr, Proc. Calif. Acad. 1: 61. 1855.

Adenostegia marítima Greene, Pittonia 2: 181. 1891.

Chloropyron marítimum Heller, Muhlenbergia 3: 133. 1907.

Plant 2–4 dm. tall, lax and somewhat decumbent, loosely much-branched, the herbage pubescent with spreading filiform hairs, some of which bear small dark glands. Leaves and bracts glaucous-green, the former oblong-lanceolate, the latter oblong, usually with a pair of short sharp teeth near apex, foliaceous; calyx 20–22 mm. long, oblong-lanceolate, enclosing much of the corolla-throat, distally with sharp teeth less than 0.5 mm. long; corolla 18–20 mm. long, its galea concave-rounded, finely pubescent dorsally, scarcely decurved at apex, and with wide purplish thin margins, its lower lip with pilose-pubescent moderately inflated pouch and minute glabrous rounded lobes; stamens 4, the slender upper filaments with slightly smaller anthers, the lower thicker and longer, with fused anthers; capsule 7–9 mm. long.

Salt marshes, Upper Sonoran and Transition Zones; along the coast from Coos County, Oregon, to northern Lower California. Type locality: San Diego, California. May–Sept.

2. *Cordylanthus canescens* A. Gray. Alkali Bird's-beak. Fig. 4917.*Cordylanthus canescens* A. Gray, Proc. Amer. Acad. 7: 383. 1868.*Cordylanthus Parryi* S. Wats. ex Parry, Amer. Nat. 9: 346. 1875.*Adenostegia canescens* Greene, Pittonia 2: 181. 1891.*Adenostegia Parryi* Greene, loc. cit.*Chloropyron canescens* Heller, Muhlenbergia 3: 134. 1907.*Chloropyron Parryi* Heller, loc. cit.*Cordylanthus maritimus* var. *canescens* Jepson, Man. Fl. Pl. Calif. 947. 1925.*Cordylanthus maritimus* var. *Parryi* Jepson, loc. cit.

Plant 2-3 dm. tall, corymbosely much branched, the young herbage pubescent with spreading fine hairs that exude a powdery whitish secretion, becoming purplish and glabrescent. Leaves and bracts glaucous-green, the former lanceolate and glabrescent, the latter ovate-lanceolate or ovate, canescent-pubescent, foliaceous; calyx 13 mm. long, canescent, lanceolate, enclosing the proximal part of the corolla-throat, distally with sharp teeth about 0.5 mm. long; corolla 15-17 mm. long, its galea concave-rounded, minutely pubescent dorsally, pale yellow, and with wide pale thin margins, its lower lip with pinard-yellow slightly inflated distally pubescent pouch and with minute glabrous rounded lobes; stamens 4, the slender upper filaments with reduced or rudimentary anthers, the lower thicker and longer, with fused anthers; capsule 10 mm. long.

Alkaline flats and marshes, Upper Sonoran Zone; interior plateaus, southern Oregon and eastern California east to Utah. Type locality: Lake Washoe, Nevada. June-Sept.



4912. *Castilleja franciscana*
4913. *Castilleja stenantha*

4914. *Castilleja exilis*
4915. *Castilleja spiralis*

4916. *Cordylanthus maritimus*
4917. *Cordylanthus canescens*

3. *Cordylanthus palmatus* (Ferris) J. F. Macbride. Palmate-bracted Bird's-beak. Fig. 4918.

Adenostegia palmata Ferris, Bull. Torrey Club 45: 420. 1918.

Cordylanthus palmatus J. F. Macbride, Contr. Gray Herb. No. 59: 38. 1919.

Plant 1.5–2 dm. tall, lax and somewhat decumbent, loosely much branched, the herbage pilose or pubescent with spreading glandless and interspersed gland-tipped hairs, the leaves glabrescent. Leaves and bracts pale green, the former oblong, rounded, entire or the upper with 1 or 2 pairs of lobes, the latter ovate, with 3 pairs of divaricately ascending lobes that radiate from the wide basal portion; calyx 14 mm. long, oblong-lanceolate, concave and enclosing the proximal portion of the corolla, distally with acute teeth 1 mm. long; corolla 15 mm. long, its galea narrowly concave-rounded, finely pubescent with reflexed hairs dorsally, with wide glabrous thin margins, its lower lip with finely pubescent slightly inflated pouch and very minute glabrous lobes; stamens 2 (only the lower pair present).

Alkaline soil, tule, Lower Sonoran Zone; Sacramento Valley, California. Type locality: near College City, Colusa County, California. June.

4. *Cordylanthus carnulosus* Pennell. Fleshy Bird's-beak. Fig. 4919.

Cordylanthus carnulosus Pennell, Proc. Acad. Phila. 99: 191. 1947.

Plant 1.5–2 dm. tall, lax and somewhat decumbent, much-branched, the herbage hirsute-pubescent with spreading glandless hairs to glabrescent. Leaves and bracts yellowish-green, the lower leaves oblong or oblong-lanceolate, smaller than the upper which have distally 1 or 2 pairs of lobes; bracts usually with 2 or 3 pairs of divaricately ascending lobes; calyx 14–15 mm. long, oblong-lanceolate, concave and enclosing the proximal portion of the corolla, distally with acute teeth 1 mm. long; corolla 15 mm. long, its galea concave-rounded, minutely pubescent with reflexed hairs dorsally, with wide glabrous thin margins, its lower lip with pubescent moderately inflated pouch and very minute glabrous lobes; stamens 2 (only the lower pair present); capsule 6–7 mm. long.

Presumably in alkaline soil, Lower Sonoran Zone; San Joaquin Valley, California. Type locality: six miles south of Kerman, Fresno County, California. July–Aug.

5. *Cordylanthus hispidus* Pennell. Hispid Bird's-beak. Fig. 4920.

Cordylanthus hispidus Pennell, Proc. Acad. Phila. 99: 192. 1947.

Plant 1.5–2 dm. tall, erect or diffuse, much-branched throughout, including small leafy shoots fasciculate in axils of stem-leaves, the herbage hirsute-hispid with spreading glandless hairs. Leaves and bracts pale green, the former oblong and entire, the latter lance-ovate, with 3 pairs of ascending-spreading lobes; calyx 14 mm. long, lanceolate, concave and enclosing the proximal portion of the corolla, entire to the obtuse apex; corolla 15 mm. long, its galea concave-rounded, finely pubescent with spreading hairs dorsally, with wide glabrous thin margins, lower lip with distally finely pubescent slightly inflated pouch and minute glabrous lobes; stamens 2 (only the lower pair present).

Presumably in alkaline soil, Lower Sonoran Zone; San Joaquin Valley, California. Type locality: Volta, Merced County, California. July.

6. *Cordylanthus mollis* A. Gray. Soft Bird's-beak. Fig. 4921.

Cordylanthus mollis A. Gray, Proc. Amer. Acad. 7: 384. 1868.

Adenostegia mollis Greene, Pittonia 2: 181. 1891.

Chloropyron molle Heller, Muhlenbergia 3: 134. 1907.

Plant 3–4 dm. tall, erect or ascending, branched, the herbage hirsute-hispid (the bracts hirsute) with spreading glandless hairs. Leaves and bracts pale green, the lower leaves oblong and entire, the upper ovate and with 1 or 2 pairs of lobes, the bracts usually with 3 pairs of ascending-spreading lobes; calyx 16 mm. long, oblong-lanceolate, concave and enclosing the proximal portion of the corolla, distally with acute teeth 1 mm. long; corolla 17 mm. long, its galea sagittally compressed, pubescent with fine spreading hairs dorsally, and with wide glabrous membranous margins, its lower lip with pubescent yellowish considerably inflated pouch and rounded glabrous lobes; stamens 2 (only the lower pair present); capsule 8 mm. long.

Salt or brackish marshes, Upper Sonoran Zone; north shore of San Francisco Bay, California. Type locality: Mare Island, San Francisco Bay, California. July–Nov.

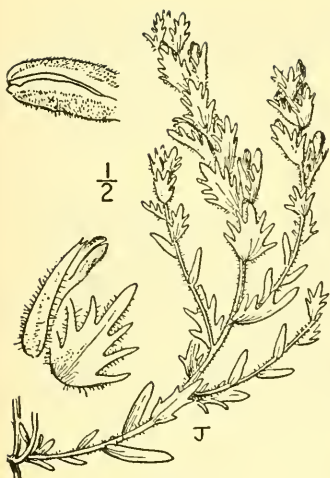
7. *Cordylanthus Héleri* (Ferris) J. F. Macbride. Heller's Bird's-beak. Fig. 4922.

Adenostegia Kingii var. *involutrata* Kuntze, Rev. Gen. Pl. 2: 457. 1891.

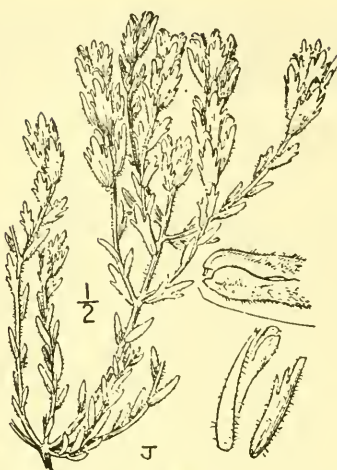
Adenostegia Helleri Ferris, Bull. Torrey Club. 45: 417. 1918.

Cordylanthus Helleri J. F. Macbride, Contr. Gray Herb. No. 59: 38. 1919.

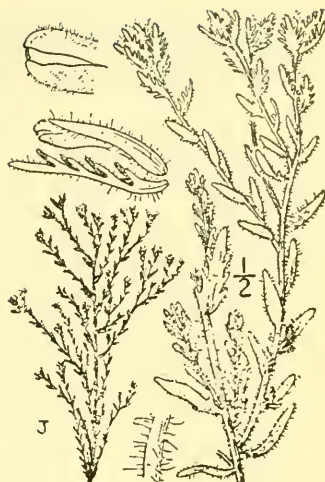
Plant 1–3 dm. tall, erect, much-branched, the herbage softly grayish-pubescent with interspersed glandless and gland-tipped hairs. Leaves linear or with a pair of divaricate linear lobes, the flowering bracts usually with 2 pairs of lobes and sometimes with 1 or 2 leaves subtending the abbreviated inflorescence, all segments linear and obtuse, often truncately so; calyx 22 mm. long, oblong, flattened from near the encircling base, distally with 2 acute teeth 1 mm. long; corolla 20 mm. long, its galea sagittally compressed, dorsally dark purple and hairy-striate but glabrous at the decurved apex, and with wide glabrous membranous margins, its lower lip with dark purple-striated moderately inflated pouch that is externally hirsute but internally glabrous,



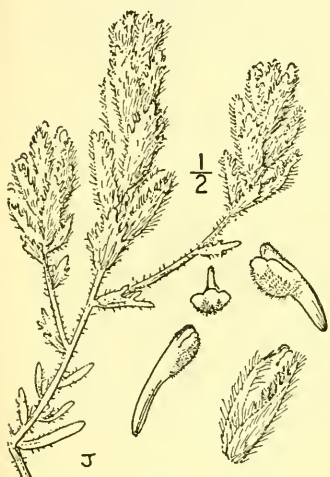
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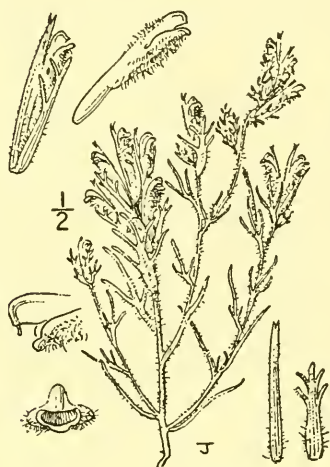
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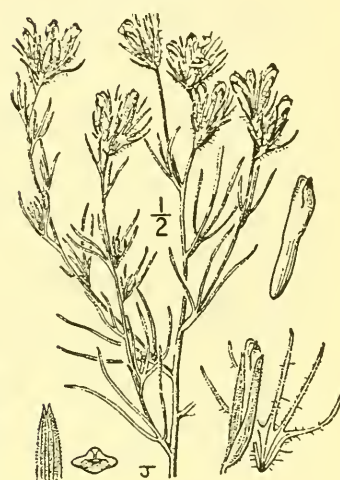
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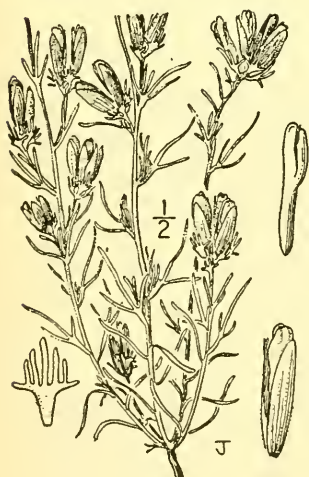
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4918. *Cordylanthus palmatus*
 4919. *Cordylanthus carnulosus*
 4920. *Cordylanthus hispidus*

4921. *Cordylanthus mollis*
 4922. *Cordylanthus helleri*
 4923. *Cordylanthus ramosus*

4924. *Cordylanthus eremicus*
 4925. *Cordylanthus bernardinus*
 4926. *Cordylanthus Ferrisianus*

and with decurved glabrous purple minute lobes; stamens 4, the upper pair with somewhat smaller anthers, all the filaments bearded; capsule 6–7 mm. long.

Gravelly sagebrush, Upper Sonoran Zone; western Great Basin, eastern California and western Nevada. Type locality: north of Reno, Nevada. July–Sept.

8. *Cordylanthus ramòsus* Nutt. Much-branched Bird's-beak. Fig. 4923.

Cordylanthus ramosus Nutt. ex Benth. in A. DC. Prod. 10: 597. 1846.

Adenostegia ramosa Greene, Pittonia 2: 180. 1891.

Plants mostly 2–3 dm. tall, erect, slenderly much-branched, the herbage grayish-puberulent with fine recurved-spreading glandless hairs. Leaves filiform, involute, entire or with a pair of filiform lobes; inflorescence shortly spicate or head-like, of 3–5 flowers, subtended by several 5-lobed outer bracts; flowering bracts 14–15 mm. long, oblong-lanceolate, entire, obtuse or rounded at apex; calyx 14–15 mm. long, narrowly lanceolate, bidentate (0.5 mm.) at apex; corolla 15–17 mm. long, brownish yellow, its galea dorsally minutely pubescent but distally yellow and glabrous, with hardened decurved apex and with membranous margins, its lower lip with horizontally widened, moderately inflated, finely pubescent yellowish pouch that is internally medianly pubescent, and with very short rounded lobes of which the median is widest and everted; stamens 4, the anthers alike and the filaments all bearded; capsule 8 mm. long.

Stony sagebrush, Upper Sonoran and Transition Zones; central Oregon and northeastern California to Wyoming and Colorado. Type locality: Rocky Mountains. July–Aug.

Cordylanthus ramosus subsp. *setosus* Pennell, Proc. Acad. Phila. 99: 193. 1947. Plants stiffly branched, 1–2 dm. tall; heads 5–10-flowered, the outer bracts with plane linear lobes, these and the flowering bracts strongly setose; corolla apparently brighter yellow, its yellow throat more strongly purple-spotted. Sagebrush, Arid Transition Zone; western Great Basin, eastern California and western Nevada. Type locality: Sweetwater Mountains, Mono County, California. July–Aug.

9. *Cordylanthus erèmicus* (Coville & Morton) Munz. Desert Bird's-beak. Fig. 4924.

Adenostegia eremica Coville & Morton, Journ. Wash. Acad. 22: 161. 1932.

Cordylanthus eremicus Munz, Man. S. Calif. 483. 1935.

Plant 2–3 dm. tall, with stiffly ascending branches, the herbage whitish, cinereous-pubescent with fine recurved glandless hairs. Leaves filiform, involute, entire or with a pair of long filiform lobes; inflorescence a short head-like spike of 3–5 flowers, subtended by several 5- or 7-lobed outer bracts; bracts and calyces with purplish callose apices; flowering bracts 13–16 mm. long, strongly purple, oblong, entire, acutish to usually rounded at apex; calyx 13–16 mm. long, oblong-lanceolate, purple, obscurely bidentate at apex; corolla 16–18 mm. long, purplish, its galea dorsally finely pubescent but only minutely so to glabrescent at the scarcely hardened apex, with membranous margins, its lower lip with horizontally widened, moderately inflated, pubescent (especially laterally) pouch that is internally loosely pubescent at orifice, and with very short wide lobes that are all everted; stamens 4, the anthers alike and the filaments all bearded; capsule 8 mm. long.

Presumably rocky soil, Upper Sonoran Zone; Panamint Mountains, southeastern California. Type locality: Panamint Mountains, at head of Death Valley Canyon, California. Sept.

10. *Cordylanthus bernardinus* Munz. San Bernardino Bird's-beak. Fig. 4925.

Cordylanthus bernardinus Munz, Leaflets West. Bot. 4: 239. 1946.

Plants 2–4 dm. tall, with stiffly ascending branches, the herbage yellowish, cinereous-pubescent with fine recurved glandless hairs. Leaves filiform, involute, entire; inflorescence a short head-like spike of 3–5 flowers, subtended by several 3- or 5-lobed outer bracts; bracts and calyces with purplish callose apices; flowering bracts 15–16 mm. long, yellowish, oblong, rounded to bluntly acuminate at apex; calyx 15–16 mm. long, oblong-lanceolate, entire or obscurely bidentate at apex; corolla 14–16 mm. long, yellowish, its galea dorsally minutely pubescent, glabrous at the slightly hardened apex, the wide margins white, its lower lip with horizontally widened, moderately inflated, pubescent (especially laterally) pouch that is internally pubescent below orifice, and with very short wide lobes that are all slightly everted; stamens 4, the anthers alike and the filaments all bearded; capsule 8 mm. long.

Alkaline soil, Lower Sonoran Zone; southern Mojave Desert, southern California. Type locality: west of Cushenberry Springs, north base of San Bernardino Mountains, San Bernardino County, California. Sept.–Oct.

11. *Cordylanthus Ferrisiànus* Pennell. Ciliate Bird's-beak. Fig. 4926.

Cordylanthus Ferrisianus Pennell, Proc. Acad. Phila. 99: 193. 1947.

Plants 4–6 dm. tall, diffusely much-branched, the stem and leaves finely pubescent with recurving glandless hairs, the bracts glabrescent on surfaces but more or less ciliate on margins. Leaves linear, with a pair of linear lobes, the segments obtuse or acutish; inflorescence a short head-like cluster of 3–5 flowers, subtended by several 3-lobed outer bracts (the lobes lanceolate or oblong); flowering bracts 13–15 mm. long, lance-oblong, rounded at apex, distally green and setose-pilose; calyx 14–16 mm. long, lanceolate, distally entire; corolla 13–16 mm. long, white (not seen fresh), its galea dorsally minutely pubescent, glabrous at apex, with wide white membranous margins, its lower lip slightly shorter, with horizontally widened, moderately

inflated, sparsely (only laterally) pubescent pouch and with apex seemingly unlobed; stamens 4, the anthers alike and the filaments all bearded; capsule 9–10 mm. long.

Open coniferous forests, Arid Transition Zone; western slopes of southern Sierra Nevada, in Fresno and Tulare Counties, California. Type locality: Paradise Valley, Kings Canyon National Park, Fresno County, California, Aug.–Sept.

12. *Cordylanthus littoralis* (Ferris) J. F. Macbride. Seaside Bird's-beak.
Fig. 4927.

Adenostegia littoralis Ferris, Bull. Torrey Club 45: 413. 1918.

Cordylanthus littoralis J. F. Macbride, Contr. Gray Herb. No. 59: 37. 1919.

Cordylanthus rigidus var. *littoralis* Jepson, Man. Fl. Pl. Calif. 946. 1925.

Plants 3–6 dm. tall, diffusely widely branched, the herbage finely pubescent with minute recurving glandless hairs (the base of the stem only hirsutulous). Leaves narrowly linear, with a pair of long linear lobes; inflorescence a short head-like spike of about 5 flowers (occasionally more), subtended by several 3-lobed outer bracts (the lobes lanceolate); flowering bracts 18–19 mm. long, yellowish green, oblong, rounded (to slightly mucronate) at apex; calyx 18–20 mm. long, oblong-lanceolate, distally minutely bidentate; corolla 20–21 mm. long, white, its throat proximally with 2 dull purple antero-lateral lines, its galea dorsally finely pubescent, distally glabrous and wax-yellow, with pale membranous margins, its lower lip equaling upper, with horizontally widened (6 mm. wide), moderately inflated, pubescent pouch that is marginally dark purple and with saucer-like amber-yellow apex that is everted but seemingly unlobed; stamens 4, the anthers alike and the filaments all bearded; capsule 9–10 mm. long.

Sandy open pineland, Humid Transition Zone; along coast of Monterey Peninsula, California. Type locality: Carmel, Monterey County, California. July–Aug.

13. *Cordylanthus platycephalus* Pennell. Broad-headed Bird's-beak. Fig. 4928.

Cordylanthus platycephalus Pennell, Proc. Acad. Phila. 99: 195. 1947.

Plants 4–12 dm. tall, with many ascending-spreading branches, not glandular, the herbage pubescent and with many interspersed longer hairs, and the bracts setose-ciliate or -pilose. Leaves linear or lance-linear, with a pair of divaricate linear lobes, the segments acutish or narrowly obtuse; inflorescence a short head-like spike of mostly 5–10 flowers, subtended by several 3-lobed outer bracts (the segments lanceolate or oblong-lanceolate and not widening distally); flowering bracts 17–21 mm. long, lance-oblong, acute, yellowish green, setose-pilose and finely ciliate; calyx 17–21 mm. long, lanceolate, distally entire or nearly so; corolla 17–21 mm. long, white, its throat with 2 dark violet antero-lateral lines, its galea dorsally minutely pubescent, wax-yellow and glabrescent at apex, with wide white membranous margins, its lower lip horizontally widened and moderately inflated, the pouch laterally finely pubescent and with narrow black margins, internally glabrous, and with its apex seemingly unlobed but lightly everted; stamens 4, the anthers alike and the filaments all bearded.

Groves or open coniferous forest, Upper Sonoran Zone; coastal hills of Santa Barbara County, California. Type locality: Montecito, Santa Barbara County, California. Aug.–Sept.

14. *Cordylanthus rigidus* (Benth.) Jepson. Stiffly-branched Bird's-beak.
Fig. 4929.

Adenostegia rigida Benth. in Lindl. Nat. Syst. 2: 445. 1836.

Cordylanthus rigidus Jepson, Fl. W. Mid. Calif. ed. 2. 387. 1911.

Cordylanthus rigidus var. *sylvaticus* Jepson, Man. Fl. Pl. Calif. 946. 1925.

Plants 3–7 dm. tall, with many ascending branches, not glandular, the herbage finely pubescent, the lower part of the stems and sometimes the leaves with some interspersed longer hairs, and the bracts from finely to strongly setose-pilose on backs and margins. Leaves linear, entire or with a pair of divaricate linear lobes, the segments obtuse or retusely truncate; inflorescence a short head-like spike of mostly 5–6 flowers, subtended by several 3-lobed outer bracts (the segments, or at least the median one, oblanceolate); flowering bracts 16–17 mm. long, lance-oblong, acute, purple or purplish green (at least often), somewhat setose-pilose and ciliate; calyx 12–15 mm. long, lanceolate, distally entire or nearly so; corolla 12–15 mm. long (not seen fresh, nor with any record of color), its galea dorsally finely pubescent, distally glabrous, with wide pale membranous margins, its lower lip horizontally widened and moderately inflated, the pouch laterally finely pubescent, internally glabrous, and with apex slightly everted and very obscurely lobed; stamens 4, the anthers alike and the filaments all bearded; capsule 9 mm. long.

In chaparral and open oak or pine forest, Humid Transition Zone; coastal mountains, Santa Clara and Santa Cruz Counties to San Luis Obispo County, California. Type locality: California. Aug.–Sept.

15. *Cordylanthus compactus* Pennell. Tight-headed Bird's-beak. Fig. 4930.

Cordylanthus filifolius var. *brevibracteatus* A. Gray, Bot. Calif. 1: 622. 1876.

Adenostegia rigida var. *brevibracteata* Greene, Pittonia 2: 180. 1891.

Cordylanthus rigidus var. *brevibracteatus* J. F. Macbride, Contr. Gray Herb. No. 49: 58. 1917.

Cordylanthus compactus Pennell, Proc. Acad. Phila. 99: 195. 1947.

Plants 7–10 dm. tall, with stiffly ascending branches, the lower shorter and foliose, the upper longer, less leafy, and terminating in inflorescences, the herbage not glandular, finely pubescent, the stem and lower leaves with some interspersed longer hairs, and the bracts and calyces coarsely setose-pilose. Leaves and leaf-segments linear and obtuse, somewhat involute, those of the main stem with a pair of linear lobes but those of the branches entire; inflorescence



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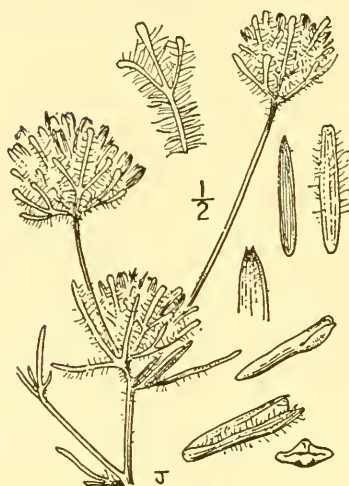
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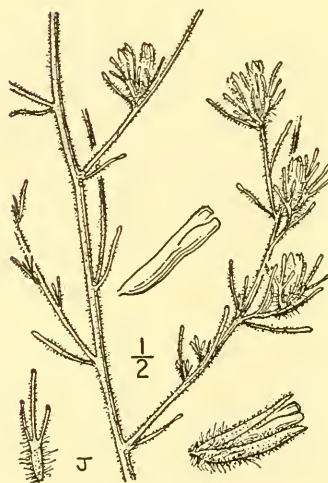
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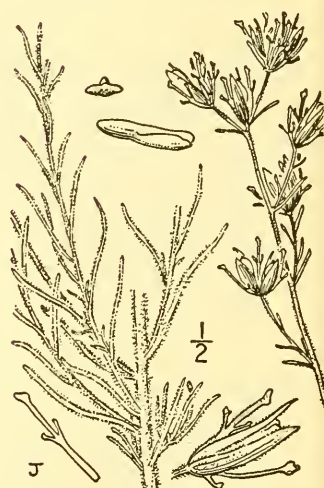
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4927. *Cordylanthus littoralis*4928. *Cordylanthus platycephalus*4929. *Cordylanthus rigidus*4930. *Cordylanthus compactus*4931. *Cordylanthus filifolius*4932. *Cordylanthus nidularius*4933. *Cordylanthus Hansenii*4934. *Cordylanthus viscidus*4935. *Cordylanthus pallescens*

a short compact head-like spike of 5–15 flowers, subtended by several 3-lobed outer bracts (the segments linear-oblong to mostly -oblanceolate); flowering bracts 13–15 mm. long, oblong, rounded or mucronulate, pale yellowish green or distally dull olive-brown, setose-pilose and ciliolate; calyx 13–15 mm. long, oblong-lanceolate or narrower, acute; corolla 12–13 mm. long, light greenish yellow, its throat with maroon lines below (but not reaching) all the sinuses, its galea dorsally finely pubescent, distally chalcedony-yellow, the apex slightly hooded by the wide white membranous margins; its lower lip slightly wider, little inflated, the pouch glabrescent, proximally dark brown, but mostly pale yellow, distally with incurved margins but without evident lobes; stamens 4, the anthers alike and the filaments all bearded; capsule 8–9 mm. long.

Sandy or gravelly granitic soil, Arid Transition Zone; western slope of southern Sierra Nevada from Mariposa County to Tulare County, California. Type locality: 3 miles east of Auberry, Fresno County, California. July–Aug.

16. *Cordylanthus filifolius* Nutt. Dark-tipped Bird's-beak. Fig. 4931.

Cordylanthus filifolius Nutt. ex Benth. in A. DC. Prod. 10: 597. 1846.

Adenostegia filifolia Abrams, Fl. Los Ang. 372. 1904.

Cordylanthus rigidus var. *filifolius* J. F. Macbride, Contr. Gray Herb. No. 49: 58. 1917.

Plants 3–12 dm. tall, with many ascending-spreading branches, not glandular, the herbage pubescent, with some interspersed longer hairs, the bracts setose-ciliate and -pilose. Leaves filiform-linear, with a pair of slender lobes, the segments usually involute and obtuse; inflorescence a short head-like spike of mostly 5–15 flowers, subtended by several 3-lobed outer bracts (the segments mostly filiform-oblanceolate, widening to callose blackish violet tips); flowering bracts 16–17 mm. long, lance-oblong, obtuse or rounded, finely pubescent and somewhat setose-pilose; calyx 15–16 mm. long, lanceolate, distally minutely bidentate and dark-callose; corolla 14–16 mm. long, white, its throat horizontally flattened and widened, rounded diamond-shaped, with 2 wide dull purple antero-lateral lines, its galea dorsally minutely pubescent, greenish yellow, glabrescent at apex, and with wide dull purple membranous margins; its lower lip horizontally widened and inflated, the pouch proximally pubescent with reflexed hairs, but internally glabrous, with apex obscurely lobed on the everted margin; stamens 4, the anthers nearly alike and the filaments all bearded; capsule 10 mm. long.

Sandy openings in chaparral, Upper Sonoran Zone; lowland and mountains near coast from Los Angeles County, southern California, to northern Lower California. Type locality: San Diego, California. April–Aug.

17. *Cordylanthus nidularius* J. T. Howell. Birds-on-Nest. Fig. 4932.

Cordylanthus nidularius J. T. Howell, Leaflets West. Bot. 3: 207. 1943.

Plants 2–4 dm. long, diffusely spreading, pubescent with recurved-spreading hairs, the inflorescence hirsute and evidently glandularly so. Leaves linear, entire, obtuse; inflorescence a single-flowered head-like cluster, subtended by several deeply 3-lobed outer bracts (the segments linear, abruptly spatulate-thickened, and blackish purple marginally); flowering bracts 15–16 mm. long, lance-oblong, obtuse or rounded; calyx 16–17 mm. long, narrowly lanceolate, acute; corolla 14–15 mm. long, white or lilac-tinted, its throat horizontally expanded, ventrally with purple lines, its galea distally externally pubescent nearly to the rounded apex, with glabrous membranous margins, its lower lip much widened and pouched, externally finely reflexed-pubescent, internally glabrous, the margins of the shallow lobes incurved; stamens 4, the anthers alike and the filaments all bearded.

Serpentine, Upper Sonoran Zone; Mount Diablo, Contra Costa County, California. Type locality: north side of Mount Diablo, California. July–Aug.

18. *Cordylanthus Hansénii* (Ferris) J. F. Macbride. Hansen's Bird's-beak. Fig. 4933.

Cordylanthus pilosus var. *trifidus* Rob. & Greenm. Bot. Gaz. 22: 168. 1896.

Adenostegia Hansénii Ferris, Bull. Torrey Club 45: 408. 1918.

Cordylanthus Hansénii J. F. Macbride, Contr. Gray Herb. No. 59: 36. 1919.

Plants 4–8 dm. tall, with many ascending branches, pubescent with spreading hairs of which some are short and gland-tipped while others are long and glandless. Leaves linear, obtuse or obtusish; inflorescence a 1–3-flowered head-like cluster, subtended by several 3-lobed (usually distally so) to entire outer bracts (the segments broadly linear or linear-oblanceolate), the flowering bract and calyx dark violet-purple; flowering bract 18–19 mm. long, narrowly oblong, rounded; calyx 18–20 mm. long, narrowly lanceolate, acute and slightly bifid; corolla 15–18 mm. long, apparently dark (not seen fresh), its galea dorsally pubescent, with glabrous membranous margins, its lower lip horizontally widened, externally minutely pubescent, internally glabrous, the margin of the shallow lobes incurved; stamens 4, the anthers alike and the filaments all bearded; capsule 9 mm. long.

Gravelly open places among oak and pine, Arid Transition Zone; southern Cascade Range and Sierra Nevada from Shasta County to Tuolumne County, California. Type locality: Agricultural College, Amador County, California. July–Aug.

19. *Cordylanthus viscidus* (Howell) Pennell. Viscid Bird's-beak. Fig. 4934.

Adenostegia viscida Howell, Fl. N.W. Amer. 537. 1901.

Cordylanthus tenuis var. *viscidus* J. F. Macbride, Contr. Gray Herb. No. 59: 35. 1919.

Cordylanthus viscidus Pennell ex Peck, Man. Pl. Oregon 675. 1941.

Plants 2–6 dm. tall, with many ascending-spreading branches, pubescent with spreading hairs of which some or most are short and gland-tipped while others are long and glandless.

Leaves narrowly linear or filiform, the obtuse tips callose-thickened; inflorescence a 1-3-flowered head-like cluster subtended by several 3-lobed outer bracts (the segments often usually involute), the flowering bract and calyx distally or wholly dull violet-purple, ending in callose, often dark or blackish tips; flowering bract usually 13-15 mm. long, narrowly oblong, rounded, entire or nearly so; calyx usually 13-15 mm. long, narrowly lanceolate, acute and slightly bifid; corolla 13-16 mm. long, its throat dorsally dark red or brown, ventrally greenish yellow, its galea proximally reddish brown, distally pale greenish yellow, at apex slightly brownish, distally medianly finely pubescent, laterally with pale membranous margins, its lower lip horizontally widened and hollowed so as to embrace much of galea, greenish yellow, with 5 maroon lines, externally pubescent, internally glabrous, the margin of the shallow lobes incurved; stamens 4, the anthers alike and the filaments all bearded; capsule 7 mm. long.

Gravelly soil, mostly on serpentine, Transition Zones; Klamath Mountains of southwestern Oregon and northwestern California, north on eastern slope of Cascade Mountains to Deschutes County, Oregon. Type locality: near Waldo, Josephine County, Oregon. July-Aug.

20. *Cordylanthus pallescens* Pennell. Pallid Bird's-beak. Fig. 4935.

Cordylanthus pallescens Pennell, Proc. Acad. Phila. 99: 197. 1947.

Plants 3-6 dm. tall, with many ascending branches, finely pubescent with spreading hairs of which only some on the stem below the inflorescence are gland-tipped. Leaves numerous on lower part of plant, distally small and remote, linear and tending to involute, obtuse; inflorescence a 1-3-flowered cluster, subtended by several 3-lobed outer bracts, the segments flat and widened distally to rounded apices, the flowering bract and calyx greenish yellow, with dark vinaceous tips; flowering bract 13-17 mm. long, oblong, rounded or minutely 3-toothed at apex; calyx 14-18 mm. long, narrowly lanceolate, slightly bifid with purple-brown tips; corolla 12-13 mm. long, its throat laterally garnet-brown, dorsally paler, ventrally yellowish white; its galea white, minutely pubescent dorsally, the rounded hardened yellowish apex fitting into concavity of lower lip, the lateral membranous margin white; its lower lip horizontally widened and hollowed so as to embrace much of galea, externally pubescent, internally glabrous, the margins of the shallow lobes incurved; stamens 4, the anthers alike and the filaments all bearded; capsule 7 mm. long.

Gravelly andesitic soil, Arid Transition Zone; western base of Mount Shasta, northern California. Type locality: Mount Shasta City, Siskiyou County, California. July-Aug.

Cordylanthus capillaris Pennell, Notulae Naturae No. 223.1. 1950. Plants glabrous, branched. Stems and leaves filiform; clusters 1-flowered, subtended by several 3-lobed outer bracts, the flowering bract and calyx equal, 15-16 mm. long; corolla 13-14 mm. long, the throat garnet-brown, galea pale, lower lip externally pubescent, internally glabrous; stamens and anthers all alike, the filaments all bearded. Alkaline soil, San Joaquin Valley. Seen only from Volta, Merced County, California, the type locality. June-Aug.

21. *Cordylanthus pilosus* A. Gray. Hairy Bird's-beak. Fig. 4936.

Cordylanthus pilosus A. Gray, Proc. Amer. Acad. 7: 382. 1868.

Adenostegia pilosa Greene, Pittonia 2: 180. 1891.

Plants 5-8 dm. tall, with many ascending branches, the herbage hirsute with glandless hairs and also pubescent with shorter gland-tipped hairs. Leaves linear, entire, obtuse; inflorescence a cluster of usually 2 or 3 flowers, subtended by 1 or 2 outer bracts which are enlarged and callosely truncate or angled at apex; flowering bract purplish, lance-oblong, obtuse or mucronately rounded; calyx 17-19 mm. long, narrowly lanceolate, distally slightly bidentate; corolla 14-15 mm. long (not seen fresh), its throat about equally wide sagittally and horizontally, its galea dorsally glabrescent, with minutely pubescent dark decurved beak, laterally with pale membranous margins; its lower lip slightly pouched, externally minutely pubescent, internally glabrous, the margin of the shallow lobes incurved; stamens 4, the anthers nearly alike and the filaments all bearded; capsule 8 mm. long.

Open hillsides, Upper Sonoran Zone; counties around San Francisco Bay, California. Type locality: Oakland Hills, California. July-Sept.

22. *Cordylanthus diffusus* Pennell. Diffuse Bird's-beak. Fig. 4937.

Cordylanthus diffusus Pennell, Proc. Acad. Phila. 99: 197. 1947.

Plants 4-8 dm. tall, with many widely ascending-spreading slender branches, canescent-pubescent with fine hairs, the stems with fine gland-bearing hairs below the inflorescences or else the plants glabrous throughout. Leaves linear or narrowly linear, entire, obtuse; inflorescence a cluster of 1-3 flowers, subtended by a few outer bracts which are enlarged and usually eccentrically angled at apex, the flowering bract and calyx ciliate-pubescent; flowering bract 14-15 mm. long, brownish but with 5 green ribs, lance-oblong, obtuse or rounded; calyx 15-16 mm. long, green, 5-ribbed, narrowly lanceolate, distally bidentate; corolla 13-14 mm. long, yellowish, its throat horizontally widened, white, its galea dorsally glabrescent, pale yellow with vinaceous flecking proximally, with glabrous decurved beak and with pale membranous lateral margins, its lower lip slightly pouched, externally minutely pubescent distally and laterally, internally glabrous, the margins of the shallow lobes incurved; stamens 4, the anthers nearly alike and the filaments all bearded; capsule 7 mm. long.

Open soil or among bushes, especially on serpentine, Upper Sonoran and Transition Zones; Coast Ranges from Trinity County to Lake County, California. Type locality: 7 miles south of Middletown, Lake County, California. July-Sept.

23. *Cordylanthus Bolanderi* (A. Gray) Pennell. Bolander's Bird's-beak.

Fig. 4938.

Cordylanthus pilosus var. *Bolanderi* A. Gray, Proc. Amer. Acad. 7: 382. 1868.*Adenostegia pilosa* var. *Bolanderi* Greene, Pittonia 2: 181. (September) 1891.*Adenostegia Bolanderi* Kuntze, Rev. Gen. Pl. 1: 456. (November) 1891.*Cordylanthus Bolanderi* Pennell, Proc. Acad. Phila. 99: 198. 1947.

Plants 4-8 dm. tall, with many ascending branches, pubescent with fine glandless hairs and also usually distally or throughout with gland-bearing hairs. Leaves linear (lower cauline ones often widely so) to narrowly linear, entire, obtuse; inflorescence a cluster of 1-4 flowers, subtended by a few outer bracts, which are scarcely or not enlarged though often callose at apex, both the outer and flowering bracts ciliate-hirsute; flowering bract 14-16 mm. long, pale yellowish green with dull purple ridges, lance-oblong, obtuse; calyx 15-17 mm. long, similarly colored, narrowly lanceolate, bidentate at apex; corolla 14-15 mm. long, its throat horizontally widened, dark purple, ventrally pale with median dark maroon-purple line, its galea glabrescent, with minutely pubescent decurved beak which laterally connects with galea-body by pale yellow wide membranous margins; its lower lip wider, slightly pouched, externally finely pubescent but glabrous at apex, internally glabrous, white or pale greenish yellow with 5 dark maroon-purple lines, distally with incurved margins; stamens 4, the anthers nearly alike and the filaments all bearded; capsule 8 mm. long.

Sandy or gravelly soil, openings in coniferous forest, Arid Transition Zone; southern Cascade Range and western slopes of Sierra Nevada, Klamath County, Oregon, to Mariposa County, California. Type locality: Mariposa County, California. July-Sept.

24. *Cordylanthus brunneus* (Jepson) Pennell. Jepson's Bird's-beak. Fig. 4939.*Cordylanthus pilosus* var. *brunneus* Jepson, Man. Fl. Pl. Calif. 946. 1925.*Cordylanthus brunneus* Pennell, Proc. Acad. Phila. 99: 199. 1947.

Plants 3-5 dm. tall, with diffusely ascending-spreading branches, the stem and the lower leaf-surfaces glabrous or nearly so, the upper surfaces of the involute leaves pubescent, the stems slightly glandular-pilose just beneath the inflorescences. Leaves filiform, entire, obtuse; inflorescences of scattered solitary flowers, each subtended by several filiform-linear outer bracts which are cuneately (and sometimes obliquely) dilated at apex, the outer bracts, flowering bract, and calyx all finely ciliate; flowering bract 12-16 mm. long, distally violet-purple, lance-oblong, obtuse; calyx 13-17 mm. long, lighter purple or mostly greenish, narrowly lanceolate, distally entire or nearly so; corolla 13-14 mm. long, its throat horizontally widened, dorsally proximally with wide dark maroon-purple streaks of which the lateral extend distally, its galea pale throughout, dorsally obscurely pubescent and yellowish-keeled distally, the decurved tip yellow, laterally white and the thin margins minutely ciliate; its lower lip wider, externally finely pubescent, internally glabrous, white with dark maroon-purple streaks, distally channeled and with incurved obsoletely lobed margins that become abruptly everted and yellow-callose; stamens 4, the anthers alike and the filaments all bearded; capsule 7-8 mm. long.

Stony andesitic or serpentine soil, Upper Sonoran Zone; Inner Coast Ranges of Sonoma and Napa Counties, California. Type locality: Mount St. Helena, Napa County, California. July-Aug.

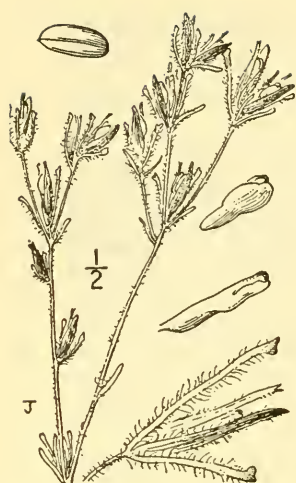
25. *Cordylanthus tenuis* A. Gray. Slender Bird's-beak. Fig. 4940.*Cordylanthus tenuis* A. Gray, Proc. Amer. Acad. 7: 383. 1867.*Adenostegia tenuis* Greene, Pittonia 2: 180. 1891.*Cordylanthus pilosus* var. *tenuis* Jepson, Man. Fl. Pl. Calif. 946. 1925.

Plants 3-6 dm. tall, with broom-like ascending-spreading branches, the stem glabrous or bifariously minutely pubescent, the mostly involute leaves finely pubescent especially on the upper surfaces, the plants not glandular. Leaves linear to filiform-linear, entire, obtuse or obtusish; inflorescence of clustered flowers, each 1-3-flowered cluster subtended by several filiform-linear outer bracts that are only slightly or not enlarged though often slightly callose, the outer bracts, flowering bract, and calyx minutely ciliate; flowering bract 13-14 mm. long, distally violet-purple, oblong, obtuse or acutish; calyx 14-15 mm. long, similarly colored, narrowly lanceolate, distally entire or slightly bifid; corolla 12-13 mm. long, its throat abruptly horizontally widened, laterally violet-purple, slightly paler dorsally and chalcidony-yellow ventrally, apparently not streaked nor strongly lined, its galea brown, distally dark purple, dorsally puberulent, laterally with pale yellow membranous margins, its lower lip wider, expanded and obscurely trisaccate, light chalcidony-yellow, externally obscurely finely pubescent, internally glabrous, distally channeled and with incurved obsoletely lobed margins that are abruptly everted and yellow; stamens 4, the anthers alike and the filaments all bearded; capsule 7 mm. long.

Open coniferous forest, Arid Transition Zone; eastern slope of Sierra Nevada from Placer County to Mono County, California, and along eastern shore of Lake Tahoe in Nevada. Type locality: eastern shore of Lake Tahoe in Nevada. July-Sept.

26. *Cordylanthus Nevinii* A. Gray. Nevin's Bird's-beak. Fig. 4941.*Cordylanthus Nevinii* A. Gray, Proc. Amer. Acad. 17: 229. 1882.*Adenostegia Nevinii* Greene, Pittonia 2: 181. 1891.

Plants 2.5-5 dm. tall, with ascending-spreading branches, pubescent (to loosely hirsute) with spreading glandless hairs, hirsute-pubescent in the inflorescence, especially on the flowering



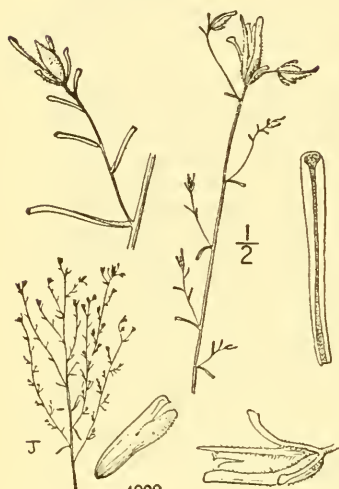
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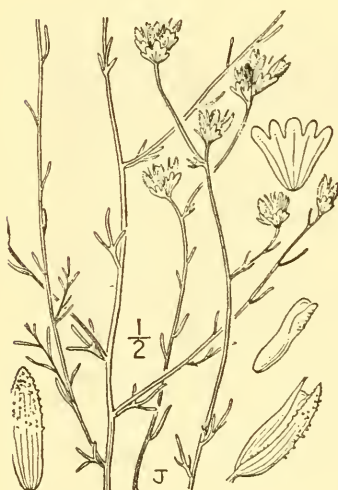
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4936. *Cordylanthus pilosus*
 4937. *Cordylanthus diffusus*
 4938. *Cordylanthus Bolanderi*

4939. *Cordylanthus brunneus*
 4940. *Cordylanthus tenuis*
 4941. *Cordylanthus Nevinii*

4942. *Cordylanthus Pringlei*
 4943. *Cordylanthus parviflorus*
 4944. *Cordylanthus capitatus*

bracts. Leaves or leaf-segments widely to narrowly linear, entire or usually with a single pair of lobes, acute to obtuse; inflorescence of clustered flowers, each 1-3-flowered cluster subtended by several 3-lobed outer bracts, their segments widely linear to oblanceolate, blunt and usually callose-tipped; flowering bract 13-15 mm. long, proximally violet-purple, oblong-lanceolate, acutish to obtuse, setose-pilose and hirsute-ciliate; calyx 11-13 mm. long, similarly colored or usually more purple, narrowly lanceolate, distally slightly bifid; corolla 15-17 mm. long (not seen fresh, nor color-record at hand), wholly glabrous, its throat horizontally much widened, its galea with decurved dark tip, to which connect the wide white lateral margins, its lower lip distally with thin incurved slightly lobed margins; stamens 4, the anthers 1-celled and alike, the filaments all bearded; capsule 6-7 mm. long.

Open soil, Arid Transition Zone; San Bernardino Mountains to Cuyamaca Mountains, southern California. Type locality: San Bernardino Mountains, California. July-Sept.

27. *Cordylanthus Pringlei* A. Gray. Pringle's Bird's-beak. Fig. 4942.

Cordylanthus Pringlei A. Gray, Proc. Amer. Acad. 19: 94. 1883.

Adenostegia Pringlei Greene, Pittonia 2: 181. 1891.

Plants 5-9 dm. tall, with many ascending branches, minutely pubescent or glabrescent, not glandular. Leaves linear, entire, obtuse, involute; inflorescence a head-like cluster of 3-5 flowers, subtended by several 3-5-lobed outer bracts that are broadly rounded; flowering bract 10 mm. long, lance-oblong, obtuse, with raised yellow glands; calyx 10 mm. long, lanceolate, obscurely bidentate or entire; corolla 8 mm. long (not seen fresh nor its color recorded), externally finely pubescent, its throat horizontally widened, its galea with rounded hooded tip to which connect the wide white lateral margins, its lower lip internally pubescent, its incurved margins essentially entire; stamens 4, the anthers 2-celled and alike, with ciliolate orifices, the filaments all strongly bearded.

Hillsides, Upper Sonoran Zone or Arid Transition Zone; Lake County, California. Type locality: Lake County, California. Aug.-Sept.

28. *Cordylanthus parviflorus* (Ferris) Wiggins. Purple Bird's-beak. Fig. 4943.

Adenostegia parviflora Ferris, Bull. Torrey Club 45: 409. 1918.

Cordylanthus parviflorus Wiggins, Contr. Dudley Herb. 1: 174. 1933.

Plants 2-4 dm. tall, with many ascending branches, glandular-pubescent throughout. Leaves linear or broadly linear, obtuse, those of the main stem mostly trifid; inflorescence of 1-3-flowered head-like clusters, subtended by several 3-lobed outer bracts (the segments obtuse or rounded); flowering bract 11-12 mm. long, purplish (as is often the entire plant), oblong, rounded; calyx 12-13 mm. long, purplish, lanceolate, slightly bidentate; corolla 15-16 mm. long, inverted, purple, its upcurved throat seemingly decurved, horizontally flattened, mallow-purple (or somewhat lighter) distally on the anterior exposed side, upper side of corolla glabrate but with 2 fine lateral lines of pubescence, its galea ascending though seeming deflexed, proximally wide, purple, laterally with wide pale membranous margins, its white tip slightly hooded, lower side of corolla (actually in upper position) externally pubescent with reflexed-spreading white hairs over the purple somewhat inflated surface, internally glabrous, the midlobe forming a wide everted callose tip which is oil-yellow or else purple, the lateral lobes shorter and less callose; stamens 4, the anthers 2-celled but those of the shorter filaments smaller, the filaments all bearded; capsule 7 mm. long.

Gravelly calcareous soil, usually among junipers, Upper Sonoran Zone; New York Mountains in eastern Mojave Desert, southeastern California, east to southern Utah and northern Arizona. Type locality: Grand Canyon of Colorado River near the San Francisco Mountains, Arizona. Aug.-Oct.

29. *Cordylanthus capitatus* Nutt. Yakima Bird's-beak. Fig. 4944.

Cordylanthus capitatus Nutt. ex Benth. in A. DC. Prod. 10: 597. 1846.

Adenostegia capitata Greene, Pittonia 2: 180. 1891.

Plants 2-3 dm. tall, with many spreading branches, loosely pubescent with glandless hairs on stem, more glandular distally and on foliage. Leaves linear or narrowly linear, obtuse, those of the main stem mostly with a pair of lobes and the lower with subtended leafy fascicles, those of the branches entire, few and remote; inflorescence of 2-4-flowered head-like clusters, subtended by several obtuse or acutish outer bracts, each with a pair of divaricate short linear-attenuate lobes; flowering bract 11-12 mm. long, purple (pale with dark ridge-lines), oblong, acutish; calyx 8-9 mm. long, purplish, lanceolate, at apex bifid, the lance-attenuate lobes 2 mm. long; corolla 11-12 mm. long, erect, straight or nearly so, purple, its throat moderately inflated, its galea narrow, dorsally finely pubescent and dark purple, the decurved apex connected evenly with the wide pale membranous margins, its lower lip usually slightly shorter than upper, slightly pouched, externally pubescent over entire width with reflexed-spreading hairs, yellowish, with glabrous slightly everted tip (of lowermost lobe); stamens 2 (only the lower pair present), the filaments glabrous, distally with widened decurved portion, the anthers 1-celled, pubescent on dehiscing surface; capsule 6 mm. long.

Gravelly soil, in open coniferous forest, Canadian Zone; eastern slope of Cascade Range in Kittitas and Yakima Counties, southern Washington. Type locality: California (by evident error). July-Sept.

APPENDIX

The following list is given to supplement the text (pp. 123-32) of the *Violaceae*. It has been compiled for the most part from the work of Milo S. Baker and Jens Clausen on the genus *Viola* in western America published in Madroño and Leaflets of Western Botany.

- Annual; stipules large, conspicuous and leaf-like. *V. arvensis*.
 Perennial; stipules inconspicuous, small, lanceolate.
 Petals lavender; hairs on style-head short, not retrorse. *V. cascadenensis*.
 Petals yellow, often purple-tinged on back; hairs on style-head long, retrorse.
 Entire plant (including capsule) except corolla, stamens and pistil densely clothed with a loose-woolly tomentum; leaf-margins essentially entire. *V. tomentosa*.
 Plants glabrous, pruinose-puberulent, short-pubescent or shaggy-villous (approaching tomentose in deeply sinuate-dentate leaf-forms of *V. aurea* and laciniate-dentate leaf-forms of *V. (purpurea) xerophyta*); leaf-margins various; capsule not woolly.
 Ovary smooth; upper petals not purple-backed or rarely so; leaves usually entire or obscurely sinuate-crenate, the blades 2-8 cm. long.
 Herbage glabrous or obscurely short-pubescent or -puberulent. *V. vallisicola*.
 Herbage, especially when young, more or less shaggy-villous (approaching glabrous in subsps. *linguaeifolia* and *major*). *V. praemorsa*.
 Ovary minutely puberulent; upper petals purple-backed; leaves shallowly or deeply crenate-denticulate, crenate-serrate or toothed; if entire the blades usually less than 2 cm. long.
 Herbage usually more or less tomentose; epidermis of the leaf-blades ash-colored; leaf-margins deeply toothed. *V. aurea*.
 Herbage not tomentose (except in form of *V. purpurea* subsp. *xerophyta*); epidermis of leaf-blades not ash-colored; leaf-margins various.
 Leaves not erect; herbage purple-tinged; flowers 8-12 mm. long; capsule 5-6 mm. in diameter. *V. purpurea*.
 Leaves erect; herbage not tinged with purple; flowers 12-15 (20) mm. long; capsule 6-7 mm. in diameter. *V. quercetorum*.
Viola arvensis Murray, Prodr. Stirp. Goett. 73. 1770. Eastern Washington, Willamette Valley, Oregon, and vicinity of Etna, Siskiyou County, California. Type locality: Europe.
Viola aurea Kell. Proc. Calif. Acad. 2:185. fig. 54. 1862. Arid sands, west central Nevada to Mono County, California.
Viola aurea subsp. *mohavensis* M. S. Baker, Madroño 10: 117. 1949. (Nomen nudum) Mono, Inyo, San Bernardino and Ventura Counties, California.
Viola Bakeri subsp. *grandis* Baker & Clausen in M. S. Baker, Madroño 10: 117. 1949. (Nomen nudum) Plumas County to Mariposa County, California. Type locality: Cisco Grove, Placer County, California.
Viola cascadenensis M. S. Baker, Leaflets West. Bot. 5:173. 1949. Cascade Mountains, Oregon, and Okanogan County, Washington. Type locality: Indian Ford Creek, five miles northwest of Sisters, Deschutes County, Oregon.
Viola pedunculata subsp. *tenuifolia* Baker & Clausen in M. S. Baker, Madroño 10: 127. 1949. Inner Coast Range, San Benito County, and southern Sierra Nevada foothills, Fresno and Tulare Counties, California. Type locality: "4 miles easterly from Pinnacles Lodge, San Benito County."
Viola pinetorum Greene. Cited as of hybrid origin between *V. purpurea* subsp. *xerophyta* and *V. purpurea* subsp. *mesophyta* (M. S. Baker, Madroño 10:118. 1949.).
Viola praemorsa Dougl. Coastal plains, British Columbia and western Washington south to Humboldt County, California.
Viola praemorsa subsp. *arida* M. S. Baker, Madroño 10: 117. 1949. (Nomen nudum.)
Viola praemorsa subsp. *linguaeifolia* (Nutt.) Baker & Clausen ex M. E. Peck, Man. Pl. Oregon 486. 1941. (*V. praemorsa* var. *linguaeifolia* M. E. Peck, Man. Pl. Oregon 486. 1941.) Eastern Washington and Oregon; also Rocky Mountain and Great Basin ranges in Montana, Idaho, Colorado and Utah.
Viola praemorsa subsp. *major* (Hook.) Baker & Clausen ex M. E. Peck, Man. Pl. Oregon 486. 1941. (*V. praemorsa* var. *major* M. E. Peck, Man. Pl. Oregon 486. 1941.) Central Washington to southern Sierra Nevada, California.
Viola praemorsa subsp. *oregona* Baker & Clausen ex M. E. Peck, Man. Pl. Oregon 486. 1941, in synonymy. (*V. praemorsa* var. *oregona* Baker & Clausen ex M. E. Peck, Man. Pl. Oregon 486. 1941, without Latin diagnosis.) Jackson, Klamath and Lake Counties, Oregon, to Siskiyou and Modoc Counties, California.
Viola purpurea Kell. Principally in the yellow pine belt from the southern border of central Oregon south in the Coast Ranges and on the western face of the Sierra Nevada to northern Lower California. Uncommon in its extreme northern distribution where it is usually replaced by subsp. *dimorpha*. Lectotype: *M. S. Baker. 8655*, two miles west of Paynes Creek, Tehama County, California.
Viola purpurea subsp. *atriplicifolia* (Greene) Baker & Clausen ex M. E. Peck, Man. Pl. Oregon 486. 1941. (*V. purpurea* var. *atriplicifolia* M. E. Peck, Man. Pl. Oregon 486. 1941.) Idaho, Wyoming and southeastern Washington south to Nevada and the eastern face of the Sierra Nevada to Inyo County, California. Type locality: Mammoth Hot Springs, Yellowstone National Park, Wyoming.
Viola purpurea subsp. *dimorpha* Baker & Clausen in M. S. Baker, Madroño 10: 122. 1949. Deschutes County, Oregon, southward to Siskiyou and Modoc Counties, California, and southward at moderate altitudes on the eastern slope of the Sierra Nevada to Inyo County, California. Type locality: Child's Meadow, Mineral-Chester Highway, Plumas County, California.
Viola purpurea subsp. *geophyta* Baker & Clausen in M. S. Baker, Madroño 10: 124. 1949. (*V. purpurea* var. *geophyta* Baker & Clausen ex M. E. Peck, Man. Pl. Oregon 486. 1941, without Latin diagnosis; *V. purpurea* subsp. *geophyta* Baker & Clausen ex M. E. Peck, loc. cit. in synonymy.) Western border of the Great Basin from Deschutes County, Oregon, to Mono County, California. Type locality: twenty miles south of Lapine, Klamath County, Oregon.
Viola purpurea subsp. *integrifolia* Baker & Clausen in M. S. Baker, Madroño 10: 118. 1949. In *Abies magnifica* belt, Klamath County, Oregon, to Glenn and Mendocino Counties in the Coast Ranges and Nevada County in the Sierra Nevada, California. Type locality: vicinity of Humboldt Summit, Plumas County, California.
Viola purpurea subsp. *mesophyta* Baker & Clausen in M. S. Baker, Madroño 10: 114. 1949. (*V. purpurea* var. *mesophyta* M. E. Peck, Man. Pl. Oregon 486. 1941, without Latin diagnosis; *V. purpurea* subsp. *mesophyta* Baker & Clausen ex M. E. Peck, loc. cit., in synonymy.) Canadian and Hudsonian Zones, Plumas County to San Bernardino County, southward on the western slope of the Sierra Nevada to the Mount Pinos region and the San Bernardino and San Jacinto Mountains, California. Type locality: Porcupine Flat, Mariposa County.

- Viola purpurea* subsp. *venosa* (S. Wats.) Baker & Clausen in M. S. Baker, Madroño 10: 123. 1949. Middle to high altitude forests, Montana and Wyoming, western Colorado westward to eastern Washington, eastern Oregon and central Nevada.
- Viola purpurea* subsp. *xerophyta* Baker & Clausen in M. S. Baker, Madroño 10: 116. 1949. Crests and high eastern slopes of the Sierra Nevada from Sierra County southward to the higher peaks of the Tehachapi, San Bernardino and San Jacinto Mountains, California. Type locality: Farewell Gap, at an altitude of about 10,000 feet, Tulare County, California.
- Viola quercetorum* Baker & Clausen in M. S. Baker, Leaflets West. Bot. 5: 101. 1948. Chaparral, digger pine and oak belt, foothills surrounding the Sacramento and San Joaquin Valleys; also Coast Ranges from southern Oregon to the Mexican boundary. Type locality: vicinity of Glenville, Kern County, California.
- Viola sempervirens* subsp. *orbiculoides* M. S. Baker, Madroño 3: 224. 1940. Type locality: foot of Nisqually Glacier, Mount Rainier National Park, Washington.
- Viola tomentosa* Baker & Clausen in M. S. Baker, Leaflets West. Bot. 5: 142. 1949. Local endemic. 5000–6000 feet altitude, Plumas County to Eldorado County, California. Type locality: "about 13 miles westerly from Cisco, Nevada Co., California, at about 5000 ft. elevation."
- Viola vallicola* A. Nels. Bull. Torrey Club 26: 128. 1899. (*V. Nuttallii* var. *vallicola* St. John, Fl. S.E. Wash. 262. 1937.) Prairies and meadows, Alberta to Montana and Colorado and westward to eastern Washington and Oregon. Type locality: Pine Ridge, Crook County, Wyoming. *Aven Nelson 4340*.
- Studies in Western Violets, I. Madroño 3: 51–57. 1935.
- Studies in Western Violets, II. Madroño 3: 232–238. 1936.
- Studies in Western Violets, III. Madroño 5: 218–231. 1940.
- Studies in Western Violets, IV. Leaflets West. Bot. 5: 141–147. 1949.
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